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19 September 1985

West Europe Report

SCIENCE AND TECHNOLOGY

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WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

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ADVANCED MATERIALS

FRANCE'S PECHINEY READY TO PRODUCE ALUMINUM-LITHIUM ALLOY

Paris AFP SCIENCES in French 25 Apr 85 p 37

[Article: "Pechiney Is Ready to Develop Lighter Metals for Tomorrow's Aircraft and Rockets"]

[Text] Voreppe--The French group Pechiney, the leading European aluminum producer, is ready to produce lighter metals consisting of an aluminum-lithium alloy and intended for tomorrow's aircraft, and it is looking for FF 300 million in financing to build an industrial foundry, officials of the group indicated on 19 April at Voreppe (Isere).

After a prototype foundry started production in 1984, at the company's research center in the Isere, Pechiney could build an industrial foundry already in 1985, "if a solution to financing problems is found," Mr Jean-Pierre Ergas, general director of Cegedur-Pechiney, told the press. The foundry could be located at Issoire (Puy-de-Dome) and it could be operational already in 1987.

According to Mr Georges-Yves Kerven, director of the Aluminum branch, aircraft operations accounted for 18 percent of the group's sales in 1984 (FF 6.4 billion out of 35) and they employ 20 percent of the personnel worldwide, i.e. over 10,000 people.

The parts made by Pechiney are already used for nearly all major civilian and military aeronautical programs, such as Boeing, Airbus, Ariane, Mirage... In 30 years, the weight of an aircraft structure per passenger carried was halved: the introduction of aluminum-lithium alloy would make it possible to reduce the weight of each part by another 15 percent.

Pechiney is eager to start industrial production of this new alloy, for its U.S. competitor Alcoa has already taken a certain lead. (Mr Andre Lajoinie, chairman of the communist group at the National Assembly, just asked that Aerospatiale should contribute to the financing of this French project.)

In addition, Pechiney officials announced three new investments: FF 200 million for the Abidos plant (Pyrenees-Atlantiques) developed in cooperation with Elf and the Japanese group Toray to produce carbon fibers; FF 11 million for the Hermillon plant in Savoy, to have a second source of aluminum powder;

and FF 90 million for a new forge at the Cezus plant in Savoy, the plant that supplies products for aircraft engines.

Answering possible criticism concerning competition between aluminum and new composite materials, Mr Kerven stated: "Among materials, it is love, not war."

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CSO: 3698/642

AEROSPACE

MATRA STRATEGY INCLUDES SELLING UNPROFITABLE ACTIVITIES

Paris AFP SCIENCES in French 4 Jul 85 p 18

[Unsigned article]

[Text] Paris--Jean-Luc Lagardere, Matra's CEO, announced on 27 June in Paris that the company is negotiating the discontinuation of several activities for which technologic synergies could not be found, notably in some sectors of automation and computer technology.

Observers note that this strategy is a complete departure from the broad diversification policy carried out by the company for the past few years. This shift results from the very heavy deficits incurred by some branches, and the company will now favor its traditional strong points: the military, space, components, transportation, telecommunications, and computer technology.

During the coming months, priority will be given to "a trajectory rectification--drastic if needed--in the areas in which we detect chronically inadequate results," meaning Matra-Manurhin-Automatic (machine-tools), microcomputers, watchmaking, as well as automobiles and automobile electronics, stated Mr Lagardere. "A sector which has not found in the company the resources necessary for its development ... cannot long remain in a situation which is not satisfactory for anyone," he added.

At the same time, Matra has announced the upcoming acquisition of Comelin (printed circuits, revenue of 122 million in 1984) from the American firm Hadco, world leader in printed circuits.

In the automation branch, the very young company Robotronics (vision systems), created in 1984, was turned over to the American Rockwell. "It is not out of the question that we might part with Matra-Manurhin-Automatic (revenue of 184 million in 1984) if it proves to be the best solution for the personnel, and we are holding discussions with partners," indicated Mr Lagardere.

For computer technology, Mr Lagardere expressed "his bitter disappointment" at not having been selected for the Computers for Everyone plan. He announced that he would specialize in intelligent, top of the line microcomputers which use telecommunication technologies.

Lastly, Matra, which announced a consolidated 1984 net profit of 68.5 million francs at the beginning of May, should register equally good, if not better results in 1985 and 1986.

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AEROSPACE

ESA GETS FOUR NEW PARTNERS FOR COLUMBUS PROJECT

Paris AFP SCIENCES in French 4 Jul 85 pp 27-28

[Unsigned article]

[Text] Paris--Space-oriented Europe is getting stronger with every passing month: the European program for the orbital station Columbus has now been joined by four more countries, and the Columbus and Ariane 5 projects are experiencing surplus budgets.

On 3 July, Michel Bignier, director of ESA's (European Space Agency) space transportation programs, announced that following the eight countries which last February, had initially decided to participate in the European orbital station program Columbus, his agency had just accepted four new members: Switzerland (2 percent of the study budget), Austria (0.5 percent), Norway (0.5 percent), and Sweden (1 percent in principle).

Moreover, Mr Bignier indicated, Denmark has increased it participation from 0.5 to 1 percent. All of these events bring the total financing of Columbus' study phase to 114.5 percent (80 million accounting units, or 544 million francs).

The distribution will be reviewed toward the end of the year, so as to bring it back to 100 percent, he said, and he added, "financing offers will probably be less eager around 1987, when it will be time to finance the station's construction (2.6 billion accounting units, or 17.6 billion francs)."

France's participation in the study phase is 15 percent, like England's, against 38 percent for FRG and 25 percent for Italy.

Another ESA program is encountering a comparable success, Mr Bignier continued: Ariane 5, the European heavy-weight launcher, which around 1995 will place into orbit a 15-ton load, and which is currently 105 percent financed in its study phase.

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AEROSPACE

BRIEFS

FRENCH AEC, MATRA EXPAND PROJECT PLANS--Paris--An announcement published by the AEC on 2 July, states that the Commission and Matra have signed an agreement to participate jointly in the Hermes orbital plane and the Columbus space module programs. As part of this collaboration, which is expected to last eight years, the AEC and the Matra group will jointly present a bid to participate in the studies and predevelopments of the manipulation systems planned for CNES' (National Space Studies Center) Hermes and AEC's Columbus. The announcement states that "AEC's expertise with remote manipulation in hostile environments (nuclear plants), and Matra's in automatic systems and space technology, should allow them to establish a predominant position in the design and construction of remote manipulation subsystems" in space. The mini-shuttle Hermes is intended to transport up to six astronauts and 4.5 tons of payload between Earth and a low orbit (400 km altitude) in which space stations will float in the next 20 years. Inaugurating the International Aeronautics and Space Salon last May at Le Bourget, president Francois Mitterand mentioned the possibility that the French would be in space aboard a Hermes before the year 2000. [Text] [Paris AFP SCIENCES in French 4 Jul 85 p 28] 11,023

CSO: 3698/581

BIOTECHNOLOGY

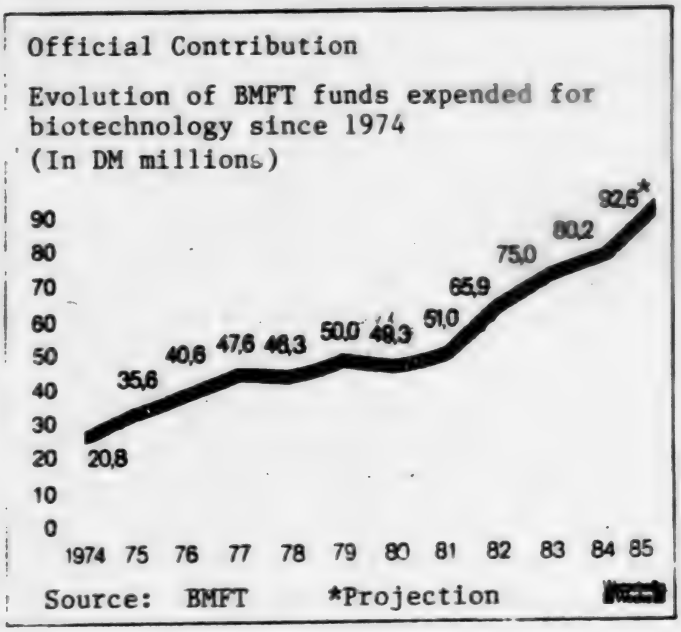
FRG'S BMFT MAKES FOCUSED EFFORT IN BIOTECHNOLOGY

Duesseldorf WIRTSCHAFTSWOCHE in German 21 Jun 85 pp 86,88

[Text] After years of unfocused support, biotechnological points of emphasis are now being set by the federal research minister. The states--with Baden-Wuerttemberg in the lead--are also moving in the same direction.

In Bonn, biotechnology's time has come. Slowly, the realization has caught on in governmental offices that "we are dealing here with fundamental technology," according to Albert Probst, non-Cabinet secretary in the Federal Ministry for Research and Technology (BMFT). And the mastery of it will determine the international competitiveness of German industry.

Against that backdrop, the financial injections, with which the BMFT supported the new technology in the past 10 years, were rather modest. It is true that the research budget has increased continually since 1974. The objects of support however appear to have been chosen in a rather haphazard fashion; the ministry has had hardly any priorities.



That changed abruptly, however, when in 1983 a commission appointed by the federal government closely examined major German research. The committee of scientists came to the conclusion that the development of new technology would have to be accelerated through closer cooperation between industry and productive major research in order to increase efficiency. Now a new plan is needed. "Research support like that of the United States is not realistic for us; therefore, we must organize ourselves intelligently," says Gert Scharrenberg of the BMFT, defining the major emphasis of the current program. In order to generate truly great accomplishments, according to the BMFT, projects of critical emphasis are to be funded. The old scatter-shot principle was filed away.

Biotechnological research is to be carried out primarily in places where industry is not far away. Therefore, research policy makers are standing behind the creation of the genetic engineering centers in Cologne, Heidelberg, Munich and Berlin. In all four cities, the chemical industry is participating financially in the research Within this framework, the following cooperation is in progress:

-the University of Cologne jointly with the Max Planck Institute for Breeding Research in Cologne-Vogelsang as well as in cooperation with Bayer in Leverkusen--BMFT annual subsidy: DM 5 million,

-the University of Heidelberg together with the German Cancer Research Center and the BASF chemical company in Ludwigshafen--BMFT annual funds: DM 6 million,

-the University of Munich jointly with the Max Planck Institute for Biochemistry in Martinsried near Munich and Hoechst AG--BMFT annual support: DM 5 million,

-the University of Berlin in cooperation with Schering AG--BMFT annual subsidy: DM 8 million.

In addition, the German research council is also supporting genetic technology oriented experiments in 14 special research areas, such as, for example, a 3-year project in genome organization or the study of the entire set of hereditary factors of a cell or an organism. However, genetic technology is only one of the points of emphasis specified by Research Minister Heinz Riesenhuber. Study teams combining industry and science are also to be created in the areas of cell culture and bioprocessing technology. Seventy-nine of these so-called integrated projects are now in progress in the various areas. Combined cost: DM 82.3 million.

The industrial partners have a special role here. Along with the cooperation, they are given the opportunity to have their employees further trained in methodology and thus to receive the essential know-how for industry-specific research. Policy makers and scientists hope that results worked out in this way will be converted more rapidly into marketable products. For, in fact, it is the utilization of basic knowledge in the market which is lacking in the FRG. Experts agree that, because of its favorable market situation, the chemical industry ignored biotechnology for much too long.

Since peak performance can only be expected from highly qualified scientists, the BMFT is also investing in education. Noting the spectacular success on the other side of the Pond, the Research Ministry, along with the German Academic Exchange Service (DAAD) and the Association of the Chemical Industry, has granted research stipends: German junior staff members will receive future instruction abroad, in order to link up as quickly as possible with the top accomplishments of others. Also Bonn granted 2 year stipends in order to force personnel transfer between research and industry at home. If the genetics engineer should find he has a taste for free enterprise, a special state program continues to help him with a supporting subsidy for founding a high-tech firm.

Whether the Bonn calculation is correct is debatable. The great chasm between research and practice can hardly be closed with government programs alone. Not only the pioneers in microelectronics had to make this bitter discovery. In a hearing before the research committee of the Parliament, many university professors last year recommended that more freedom be granted them to work with businesses--the possibilities are said to be extremely limited. Other critics stake everything directly on money: Klaus Weissermel, member of the board of Hoechst AG, pleaded for an increase in the biotechnology budget. He claims that in comparison with the major competitors, the United States and Japan, support is relatively modest.

However, the manager of the Society for Biotechnological Research (GBF) in Braunschweig does not agree. Professor Joachim Klein is satisfied with the "generous support from Bonn." No wonder: his society was designated the national major research center in the restructuring of biotechnological research. The researchers in Braunschweig, who receive 90-percent financing from the state of Lower Saxony, are receiving a budget of DM 30.7 million in 1985. And an increase is expected for 1986 through expansion investments.

For Lower Saxony, Braunschweig was the decisive factor for the entry into the new fields. The regional policy goal is to create a center for biotechnological research on the border area with East Germany. The GBF is to be supported among other things by a course of studies in biotechnology at the Technical University of Braunschweig. The state has authorized approximately 100 positions for it.

Berlin also received additional support for biotechnology through its participation in the genetic technology points of emphasis in its cooperation with the Schering plants. The city fathers plan to found a biotech center and to recruit foreign companies to participate in it.

By comparison, other federal states are holding back. Thus, for example, Klaus Jasper, head of the Medium-sized Industry and Research Department of the Bavarian State Ministry of Business and Transportation, emphatically rejects a program of biotechnological subsidies: "We are not going to do anything so specialized." Bavaria needs, according to him, broadbased support for its medium-sized industry. Furthermore, he feels there is still too much speculation in biotechnology.

In contrast, the Swabians are dashing forward in the race among the regions. The people of Baden-Wuerttemberg, great believers in technology, worked out a program a long time ago concerning the best use of biotechnology in their state. They especially hope for good prospects in their medium-sized industry through industrial process engineering. In Stuttgart, the Fraunhofer Institute for Membrane Technology and Bioprocess Engineering is already working very successfully. The state's technology representative, Professor Johann Loehn, stresses confidently: "We are beyond pure research--we are already thinking about application."

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CSO: 3698/637

NEW FRG AID PROGRAM FOR BIOTECHNOLOGY INDUSTRY

Duesseldorf HANDELSBLATT in German 12 Jul 85 p 5

> [Text] Bonn--With a new aid program, Federal Research Minister Heinz Riesenhuber intends to support the introduction of new methods in biotechnological production beginning 1 January 1986. He estimates the volume of subsidies at approximately DM 100 million for the period through 1989.

Because of its high potential for innovation, biotechnology is taking on a rapidly increasing significance. The know how required for it is largely available only in beginning stages so that considerable delays in the introduction of appropriate processes could arise.

Riesenhuber hopes to support especially product developments in cell culture technology, genetic engineering, microbial technology, technical enzyme processes and development of the bioreactor.

All legally independent enterprises working in these areas may therefore obtain non-repayable grants of 40 percent of subsidizable costs, with a maximum of DM 600,000 per firm.

Up to this maximum subsidy, contributions may be granted to several developments of an enterprise. The following costs are fundable:

Payment of research and development personnel including a lump sum for additional personnel costs and miscellaneous overhead, expenses for research and development orders to third parties, and external expenses for consultation within the framework of the development project.

In the case of economic goods over DM 800, there are additional subsidies for investment costs. The amount of this allocation is set at 25 percent of the total cost of investments. A larger amount cannot be awarded here since the right to a (Restwertabgeltung) and proportional repayment of possible (Investitionszusagen) is renounced.

Funded projects must be carried out and exploited in the FRG. Accumulation of these new subsidies with other support funds is not allowed.

Application and approval processes are to be executed simply and along broad lines. Individual company decisions about development of biotechnological products and processes are left to free competition.

Riesenhuber further stressed that the federal government will spend a total of DM 1.14 billion for applied biology and biotechnology by 1989. Approximately 50 percent of that is to be allotted to the Society for Biotechnological Research as a national center for major research as well as to the genetics centers in Cologne, Heidelberg and Munich.

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CSO: 3698/617

BRIEFS

BIOGEN, SUMIMOTO PHARMACEUTICAL AGREEMENT--Geneva--Biogen N. V. and Sumimoto Pharmaceuticals have just signed in Tokyo a cooperation agreement to develop a human-based granulocyte-macrophage colony stimulating factor (GM-CSF). As its name indicates, GM-CSF stimulates primarily the multiplication of two important types of leukocytes, the granulocytes and the macrophages. These blood cells are involved in the body's immune response and play a front line defensive role against infection. That is why it is believed that GM-CSF could prove useful in stimulating these leukocyte populations in persons whose immune response is weak, as for instance in cancer patients undergoing radiation or chemotherapy treatments, as well as to combat infections which resist conventional treatments. Biogen's researchers have succeeded in producing a human GM-CSF by using genetically manipulated micro-organisms. Only infinitesimal amounts of this substance, extracted from natural sources, were available until now. According to the terms of the agreement, Sumimoto acquires exclusive sales rights on the Japanese market, and promises to support the research and development of the product by Biogen. Sumimoto Pharmaceuticals, a large Japanese producer of pharmaceutical products, carries out an active program in biotechnology. GM-CSF fits well in Sumimoto's range of biological and conventional products. [Text] [Paris AFP SCIENCES in French 4 Jul 85 p 56] 11,023

CSO: 3698/581

CIVIL AVIATION

BUSINESS BOOMING AGAIN FOR NETHERLANDS' FOKKER

Rotterdam NRC HANDELSBLAD in Dutch 1 Aug 85 p 9

[Report: "Fokker Definitely Upward Bound Thanks to Stream of Orders for F-100"]

[Text] Amsterdam, 1 Aug--After a number of meager years, the Fokker concern is facing a--somewhat pleasant--new problem: where to get the skilled workers to build the new machines wanted in the unexpectedly attractive market. With the almost 100 orders for the 4 machines which are or will be in production this year--F-27, F-28, F-50 and F-100--, a decision will have to be made at the end of 1985 on the production pace.

"In any event we will continue to make a strong appeal to the labor market," says spokesman G. Knook of Fokker. "Last year we hired 600 new people, and this year we'll undoubtedly do likewise. Our training schools are at full capacity with 300 students and those people will be included in the production process 2 years from now. Our total personnel complement--9,600 at this time--thus will rapidly increase to 10,000 and to 12,000 in a few years' time. We are especially interested in people with advanced training, especially automation experts."

The fact that Fokker's development would take place so rapidly certainly was not predictable less than 2 years ago, after the debacle of the cooperation with the American partner McDonell-Douglas.

Together with the Americans, an attempt was made to develop a new aircraft for 150 passengers--project name MDF-100--;however, not even taking into account the less than optimal level of cooperation, it turned out there was no market for it at the time. With government support, Fokker subsequently concentrated only on improving its two showpieces, the F-27 and F-28; with new engines, a better cockpit and a modernized interior, the F-27 became the new F-50 and an expanded form of the F-28, along with new Rolls-Royce engines partly produced the F-100 look. "Old wine in new bottles," the French spokesman of competitor Airbus commented casually, but meanwhile the buyers appear to have a different opinion.

Promotion

Success did not come by itself. Last year the Fokker salespeople thought up a "sales-center" in a Schiphol hangar, complete with a full-sized cockpit and passenger areas--a "mock-up"--of both the F-50 and F-100. An audiovisual presentation was added to it and a pleasantly appointed area in which negotiations could take place. When Swissair turned up in the market as the first big customer, the interiors were feverishly decorated with Swissair colors, and when the order was in, there was a hurried conversion to USAir colors.

"The story that USAir director Edwin Coldony hurt himself while entering the "mock-up" and therefore stretched out the negotiations, afraid in advance of greedy claims for damages by passengers, is interesting but I cannot vouch for it," said Knook. "It is a fact, however, that we are making the passenger doors higher for USAir, but we have also modified the door in order to get the KLM order. The negotiations with USAir did take a considerable time, indeed."

Flexible

Fokker is not very talkative as to the prices agreed upon. With the first customers, the "launching customers," it admits dealing as flexibly as possible in order to break open the various market segments. In Europe that was done by Swissair and KLM and now in the American market via Swissair.

The competition is indeed murderous. Also in the market, with slightly larger machines, are Boeing with the 737-300, McDonnell-Douglas with the MD-82 and Airbus with the A-320. The various builders are now directing all their energy at fleet-modernizing aviation companies such as SAS and the American TWA. The doubly enthusiastic Fokker salespeople are very busy, and they are especially optimistic about SAS, which is cooperating with KLM and Swissair in aircraft maintenance.

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CSO: 3698/641

FACTORY AUTOMATION

BMW ORGANIZES MATERIALS FLOW ON 'JUST IN TIME' PRINCIPLE

Munich INDUSTRIEMAGAZIN in German Jul 85 pp 103, 104, 106

[Article under rubric: "BMW Logistics": "Competence Shifted"]

[Text] BMW AG in Munich is having its central depot in nearby Eching managed by the shipping agency Schenker. The automobile builders are thus inaugurating a new dimension in procurement logistics.

"This cooperation has the nature of a model," rejoiced Dr Karl Uebelacker, chairman of the management of the transport enterprise Schenker & Co. GmbH in Frankfurt, "because it redistributes the roles between shipping agencies and industries."

Heinz J. Preissler, director of the traffic system at the Munich automobile producer BMW, even sees the concept as "the beginning of a new age in logistics."

What elicits such almost enthusiastic opinions from the two is indeed unique among German firms up to now: the large shipping agency Schenker will have full responsibility for managing the new Central Off-Plant Warehouse (ZAL) of the Bayerischen Motoren Werke AG in Eching (investment volume DM53.3 million, 28.5 hectares storage area, and 200 jobs) on its own and will simultaneously guarantee the "production-synchronous supplying" of the BMW assembly lines in Munich-Milbertshofen. The flat warehouse is now going into operation and the high-rack warehouse will follow in December.

To be sure, the chemical giant BASF in Ludwigshafen is allowing smaller distribution warehouses to be managed by an outsider (the shipping firm Rhenus WTAG in Dortmund), and the commercial firms Woolworth and Quelle are passing on discretionary procurement services including warehousing tasks to the shipping agency (Schenker in this case), but until now no German industrialist has ever completely entrusted his often ticklish "materials handling" to strange hands.

For BMW, the contract with Schenker (DM6.8 billion in sales and 11,500 employees) is part of a new logistics strategy that, according to board member Dr Helmut Schaefer, will "further reduce inventories and thereby the costs of tying up capital." In the future, material is to lie unused in the warehouse for no more than 5.5 days compared to today's 7.5 days. Schaefer, responsible for the department "Logistics and Purchasing" at BMW, reveals the ultimate goal: "We want to organize the entire chain of the material flow between the supplier and the final consumer in accordance with the just-in-time supply principle."

The reason behind the new thinking: the current procurement structure of the Munich company is too costly and is increasingly a load on enterprise profits. Some weaknesses are, for example:

--The geographical disadvantages; the average distance from BMW Munich to its suppliers is 450 kilometers, farther than for almost any competitor. By way of comparison, the Japanese automobile producers, Toyota for example, have their satellites at a distance of 40 to 60 kilometers.

--Producer and suppliers maintain costly warehouses at the same time.

--Too many trucks have to be used for material transport, trucks that often travel half empty. At Milbertshofen, as many as 300 trucks crowd around the ramps in the early morning hours.

--In recent years, smaller and uneconomical reserve warehouses sprang up around Munich. Thre reason: the expanding production had required every available place at the plant.

Now, with the Eching project, the Bavarians are hoping to come a good deal nearer to a more comprehensive solution to the problem: the new central off-plant warehouse before the gates of the metropolis on the Isar "brings together the warehouses of the suppliers and BMW" (Schaefer), thus permitting an improved and tighter disposition of materials--specifically, a faster order-related removal of materials even in small lot sizes directly to the "target stations" of production. This also saves line space for assembling materials.

And: in the future, instead of 300, only 150 trucks--low-noise special vehicles at that, precommissioned and fully loaded--will serve the Munich plant daily.

Cost Advantages

Schenker is responsible for the commuter traffic between the ZAL and the production at Milbertshofen as well as for the management of the warehouse from the time that goods are received until they are moved out. The logistical segment from the supplier to the warehouse, however, remains in the custody of BMW. For this, however, the Munich company has efficient regional shipping agents under contract that initially collect the ordered material before then carting it, usually during the night, with fully loaded trucks ("full-load traffic") to the ramps of the central warehouse in Eching, a

procedure that has proven itself in supplying the warehouses in Munich, Landshut and Dingolfing.

Quality control of the incoming components is also a matter for BMW. About 90 of the 200 workers that the new warehouse in Eching will employ are on the payroll in Munich.

But why is warehouse management along with the just-in-time supplying of production being turned over to outsiders? "We have figured it out," notes logistics manager Preissler dryly, "and it is cheaper for us." Above all the cost structure of the shipping agent is better. BMW warehouse clerks are paid according to "expensive" metalworkers' rates, whereas shipping workers are paid according to more favorable OeTV [Public Service, Transportation and Communications] agreements. The result is that Schenker can offer his services at a more advantageous cost compared to BMW's own solution.

The Frankfurt shippers are compensated according to the volume of the commodity turnover. In addition, Schenker--builder and owner of the building complex in Eching--receives a fixed rent for the "holding" and utilization of the warehouse by BMW.

The advantages flowing to the two partners from synergetic effects are difficult to determine specifically: the automobile manufacturer BMW brings its knowledge of industrial material flows into the cooperation and Schenker provides "specific transport know-how in the organization of procurement and distribution processes" (Uebelacker).

Schaefer's fellow board members from the automotive branch, including Daimler-Benz's chief logistician Walter Ulsamer, for example, are reacting to the plans of the Munich company with skepticism, however. Outside management of a materials warehouse? That seems fishy to many who think that such a concept cannot go well, for unaccustomed interface problems affect supply security.

Training

"It will go well, I am sure of it," counters Schaefer, who created a stir once before in 1976, when he established for BMW the umbrella or cross-sectional function of logistics as the control mechanism for purchasing, technology and sales (total material management). To be sure, the manager admits that at the time it took courage to take this step. It is no different now, "because we are again breaking new ground."

But he will try to minimize risks as much as possible. Thus a full year ago,the off-plant warehouses in and near Munich (which will be dissolved after the new warehouse begins operations) were turned over to the outside management of the approximately 100 Schenker employees foreseen for Eching. "We are happy about this," says Schenker chief Uebelacker, "it facilitates not only our breaking into the field but also the training of a permanent staff."

Uebelacker is proud that his company is being allowed to lead a new development. For projects a la BMW/Schenker are still unusual today, to be sure, but in just a few years they could be commonplace in the interplay between the shipping agent and the manufacturer.

Competitors such as Rhenania Schiffahrts- und Speditions- Gesellschaft mbH in Mannheim or Rhenus WTAG in Dortmund are already plotting similar concepts with industrial partners, projects that in part go even further, even including warehouse financing, for example.

"In the future, the market will increasingly require the offering of complete logistics systems by the shipping agent," thinks Schaefer from BMW. The "last great rationalization reserve logistics" demands that new paths be taken when it is a matter of "bringing the procurement markets quite close to production in a cost-effective manner."

Driverless Electric Lifts--How BMW's New ZAL in Eching Works

The most up-to-date material-flow techniques determine the concept of the new ZAL of Munich's BMW AG in Eching in all stages of handling:

--in the receipt of goods, which is linked with the storage area itself by means of the most up-to-date conveying techniques;

--in integrated quality control, whose testing functions are centralized and computer-controlled;

--in the high-rack warehouse fully automated through electronic data processing with more than 10,000 pallet places--the realization was turned over to the Swiss company OWL Lagertechnik AG in Buchs near Aarau;

--in the computer-controlled flat-rack warehouse with 15,000 pallet places (concept Agiplan, Muelheim/Ruhr);

--in the computer-controlled small-parts warehouse with 28,000 storage units and

--in the goods outgo with up-to-date transshipment techniques and places for special trailers in the storage area.

All material movements are largely computer-controlled with the help of fully automated conveying installations and driverless electric lifts. All functions communicate over a decentralized network with electronic data processing. The following sequence of operations is usual thereby:

When a supplier transport arrives at the ZAL by train or truck, Schenker employees check the number of parts immediately after unloading (when the goods are received). At the same time, a computer writes the waybill, which includes a so-called bar code with information on contents and location. After the quality control carried out by BMW employees, the pallets travel with the material on the fully automated conveyor line in accordance with the bar code information to their location determined by computer.

The resupply requirement on the production lines in the plant is reported over a mobile terminal to the central computer installed there and is ordered at the ZAL administrative computer over a dedicated circuit. This computer relays its shipping-out orders to the computers in the individual areas, and these computers automatically ensure the commissioning and transport of the storage units to the loading ramp.

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CSO: 3698/636

FACTORY AUTOMATION

EUROPEAN ROBOTICS DISPLAYED IN HANNOVER FAIR

Brussels INDUSTRIE in French Jun 85 p 25

/Article by Guy Denuit: "Robotics in Hannover: Japanese Disinterest"/

> /Text/ As every year, the Hannover Fair kept its promise. In robotics we were particularly struck by developments in software and traditional products where the performances have been improved.

There are really only two possible ways to visit the Hannover Fair: either rent a motor home and put it in the parking lot two days before the opening, or go by air (fly to the airport and then helicopter to the fair). Indeed, by 9:30 am all the lots are full in spite of the 55,000 available places. This did not prevent us from visiting some 97 stands showing industrial robots, which were grouped in halls number 22 and 23.

The exhibitors had made a great effort to show actually functioning applications and to bring many innovations (which are listed below in five categories) that are characteristic of the development of industrial robots in general.

/First,/ a sophistication of robot intelligence and of their means of communication with the outside world: We remember for instance a small but very impressive number of Seitner programmed robots with six sensors which made it possible to remotely control the velocity and position of the robot's six axes by very simple hand pressure.

In the GdA [not further identified] stand a CAD [Computer Aided Design] robot integrated cell, made in cooperation with Matra, opens so many new perspectives that, as the exhibitors admit themselves, it makes potential users feel dizzy. In comparison, the robot with vision exhibited in the same stand seemed already relatively conventional. Speaking of vision, three Belgian exhibitors which are active in this field deserve special mention: ADB, Icos and Tecnomatix. Tecnomatix imports hardware, ADB has imported a complete specialist firm and Icos chose the most hazardous task: that of creativity.

The second evolutionary axis: a proliferation of assembly robots of the Scara (Selective Compliance Assembly Robot Arm) type. Besides the large reputable companies such as IBM, Bosch and Seiko, relatively new and almost identical machines could be admired at the stands of Hirata (an awkward name in French-speaking countries); Moeller Automation, a subsidiary of Klöckner-Moeller; Mantec, a Siemens subsidiary; Unimate, a Westinghouse subsidiary and AEG. The reason for the interest of electrical manufacturers in robotics is simple: these robots were first developed for internal use, more or less following the example of car manufacturers such as VW, Renault and GM.

Third tendency: peripherals adapted to robots, e.g., the automatic tool changer of Fein, production systems using pallets or magazines seen at the IBM and Messma stands, or the enormous range of accessories of Bosch and Moeller and, finally, the automatic vehicles of ASEA.

Fourth phenomenon: modularity is once again fashionable with the same advantages of flexibility and attractiveness to engineers who miss their Meccanos /erectorsets/ and with the same disadvantages of undistinguished performance by hodgepodge combinations of modules. These were in use at the stands of Bosch, Felsomat, Kuka and Moeller.

Finally, the most important /evolution/ in our opinion: the impressive performance of conventional products in which the speed, precision and the ratio of space requirement to work load has been optimized. The most important innovations in this field are: the Reis RR H-15, the Jungheinrich R-80, the Kuka IR 360/8 and the Unimates 700 and 800 in the very powerful VAL II language.

One more reflection on this fair which, as every year, kept its promise: Despite the large number of robots exhibited, all of which seemed advanced, the Japanese were not interested in the European market. "Business with no profit," commented a Japanese representative. We do not want to share any responsibility for his opinion.

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MICROELECTRONICS

THOMSON, GEC, PHILIPS, SIEMENS IN JOINT EUREKA PROJECT

Paris ELECTRONIQUE ACTUALITES in French 28 Jun 85 pp 1, 4

[Unsigned article]

[Text] Four of the major European electronic companies--France's Thomson, England's GEC, Germany's Siemens, and the Netherlands' Philips--have issued a joint statement of intent about their wish to cooperate on various projects in the Eureka program. These projects would be aimed particularly at data collection and processing, and at complex decision making systems, such as air and land traffic control, surveillance of space and from space, production automation, and the television of the future.

All these techniques, the four partners point out, require the development of strategic components such as advanced microprocessors (Europrocesseur), gallium arsenide integrated circuits, microwave components, high density memories, flat screen displays, and sensors of all types.

The four companies believe that "the Eureka program can become an essential element allowing Europe to accept the challenge of technology, particularly in light of the efforts undertaken by other nations in advanced electronics" (the allusion to the American IDS--Strategic Defense Initiative--project is barely veiled).

GEC, Philips, Siemens, and Thomson feel that the Eureka program will focus the European research potential on a small number of projects, designed to encourage the development of equipment and systems likely to find both civilian and military commercial outlets and applications. Lastly, the four companies emphasize their wish to find themselves associated with other manufacturers and national research centers in any of their possible joint projects, and declare themselves ready to examine the various aspects of the cooperation foreseen on these projects, during the six months after the governments decide to initiate the Eureka program.

Six Components Areas

At the present time, the framework of this collaboration is relatively defined only for components. Six topics have been determined: microprocessors, memories, GaAs integrated circuits, hyperfrequency components, flat displays, and sensors.

In microprocessors, the aim is to develop a line of circuits useful both for advanced computer technology and for artificial intelligence. The project's authors have agreed on:

A multiprocessor architecture that is fault resistant, has an "immense" address space distributed over a large number of locations, and allows the construction of installations ranging from small work stations to large configurations, with the same line of chips;

Micron, followed by sub micron silicon technology;

Possibility of integrating part of the software.

For memories, the official project indicates only very advanced RAM's, and stresses the need to develop equipment for their fabrication.

Gallium arsenide should also be used for the sensitive portions of real time and scientific computers, as well as for very rapid memories.

Microwave components included in the project are those for radar equipment, and for the television of the future and telecommunications; emphasis would be placed on digital and linear integrated circuits, and on discrete semiconductors based on GaAs or InP.

In flat screen displays, the vagueness of the official terms allows all suppositions: "The studies will bear on large, high resolution, color flat screens." In principle, these terms should therefore include screens for high definition television.

The sensors developed would be used primarily for automatic equipment and robotics; listed are optical vision, infrared, X-ray, and acoustical sensors.

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MICROELECTRONICS

FRANCE'S RIBER WANTS TO SHOW ITS VITALITY

Paris ELECTRONIQUE ACTUALITES in French 7 Jul 85 p 17

[Article by J. P. Baranes]

[Text] ISA-Instruments S.A. (specialized in scientific instrumentation) has been a topic of discussion in recent months following its establishment as an independent and financially reorganized company; as part of this step, one of its major divisions, Riber, has demonstrated its vitality (i) by presenting new and original products (such as a surface and interface analyzer which is supposedly the only one in the world to be optimized both for ESCA, Auger, and ELS-energy loss), and (ii) by presenting its sales results (in 1984, Riber exported more than 80 percent of its production).

All of this took place during the (belated) inauguration of its plant.

About 120 people were present at this event, among which were some of Riber's research and manufacturing customers, as well as members of various organizations and government agencies.

Riber's activity is focused on three product lines:

Ultra-high vacuum systems and components;

Surface analysis systems (ion microprobes);

Molecular jet epitaxial reactors (semiconductor development tools).

Riber dominates the world market in molecular jet epitaxial reactors, and is one of the leaders in ion microprobes.

During a short speech he gave during this open house day, Michel Beaudron, ISA's CEO, indicated that "we are the only French company to have mastered the technique of clean ultra-high vacuum."

ISA is currently active on the American and Japanese microprobe market, "but," added Mr Beaudron, "we believe that the French and European microprobe market is significant."

In fact, in the ion microprobe field the company showed an instrument, the model MIQ 156, which uses a cesium source and is capable of high sensitivity and resolution.

Riber has recently sold two ion microprobes abroad:

One to the American company Mac Krone Associates, and the other to its commercial representative in Tokyo, which bought it to open an applications laboratory.

Among other recent exportations of ion microprobes are those for the University of Illinois in Chicago.

Created in 1960, Riber today employs about 177 people, and in 1984 had revenues of 106 million francs before taxes. In four years, its orders climbed from 40 to 120 million francs before taxes.

Its director, Michel Culleron, is also deputy director general of ISA.

About twenty staff members and engineers were hired in 1984; they were joined by twenty more in 1985.

During the open house day, the company showed three new products which we have described in connection with the Physics Exposition of December 1984, and which are still very interesting:

A surface and interface (interfaces between media, of course) analyzer, the only instrument according to Riber, which is optimized for ESCA, Auger, and energy loss (ELS).

The instrument has excellent energy resolution, is insensitive to sample position, and is capable of very rapid analyses (10 minutes per sample);

An ion microprobe which uses a technique called SIMS (secondary ion mass spectrometry), with sensitivity greater than one ppb (part per billion), depth resolution less than or equal to 30 A, spatial resolution better than 2 microns, and rapid analysis due to the simple operation of the analyzer;

A microprofilometer presented as the only instrument in the world whose ion beam performs microanalysis by eroding microcraters of less than 100 square-microns; this performance is claimed to represent a fundamental progress in the analysis of industrial samples, particularly for integrated circuits.

In addition to this equipment, Riber pointed out that it had upgraded it manufacturing to reflect the necessary computerization and automation of its new equipment.

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MICROELECTRONICS

FRG TURNS EFFORTS TO LASER DEVELOPMENT

Munich SUEDDEUTSCHE ZEITUNG in German 17 Jul 85 p 25

[Article by Klaus Gertoberens of the editorial staff: "The Power of Focused Light; the Laser Becomes a Key Technology; FRG Limps Along Behind"]

> [Excerpts] Munich, 16 July--The "Open Sesame" into a guaranteed industrial future is "laser." In terms of its technical and economic significance this "key" technology can only be compared with the triumphal march of microelectronics. Lasers are light sources which emit highly focused, intense rays with virtually infinite potential applications. "Lasers" (Light Amplification by Stimulated Emission of Radiation) are used especially in measurement technology and medical technology as well as in optical communications engineering. As wearfree universal machine tools, they are even assuming great significance in production. And not insignificantly the light has become a weapon. Nickname: Star Wars.

Only slowly are German companies awakening from their Sleeping Beauty slumber. So far 50 enterprises have discovered the laser market. Whether they--with the exception of a few spectacular individual cases--can challenge the giants in Japan and the United States is debatable.

In contrast to his counterparts in the forward-moving competitive countries, Research Minister Riesenhuber says on the occasion of Laser '85 that the introduction of laser engineering geared to market requirements is a job for the firms themselves. At the same time he complains that in applied research and its conversion into products there exists a perceptible need to catch up. He therefore intends to support laser technology with DM 140 million from 1986 to 1989. However, this contribution is relatively small.

Research and industry already know how to help each other. The German research council supports, for example, development of the laser into a major emphasis program. The University of Siegen is cooperating in the development of special dye lasers. In cooperation with the Technical University of Munich, a laser is being constructed which emits impulses of infrared light with which it is possible to test the smoke from industrial smokestacks from a

distance of several kilometers and thus catch polluters. In Aachen, to cite another example, the first German university chair for laser engineering will soon be established. In addition, in 1986 the newly founded Fraunhofer Institute for Laser Engineering will open here. In the next 5 years, DM 30 million are to be invested in this research facility. The Institute for Laser Technology in Medicine, which has recently opened in Ulm, is to foster further linkage with international competition. This institute, supported by the nearby firms of Aeskulap-Werke AG and Carl Zeiss and cooperating closely with them, ought to form a beneficial bridge between academic endeavor and practical application.

Successful Bridge Building

These two firms are also jointly participating with MBB-Medizintechnik GmbH of Munich as partners in the newly founded Laser Medicine Center GmbH of Berlin. As in Ulm, there is to be close cooperation with the university. This MBB affiliate has already taken on new impetus with its surgical laser "Medilas": last year it raised the company's turnover by almost 40 percent to DM 20 million. Since the light of a laser can be so exceptionally focused, it is utilized not only in medicine but also for drilling and cutting. As long ago as 1970, Ford put a cutting laser into operation in Cologne. Also at Daimler-Benz, the so-called tappet, a connecting piece between the cam and the valve shaft, is welded by laser. A few weeks ago in Ingolstadt, Audi also began using this technology. The mechanical engineering firm of MAN in Augsburg offers a further example of the triumphal entry of the laser into production technology. MAN is the only production firm which utilizes the laser for surface processing, namely for the hardening of engine parts.

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MICROELECTRONICS

BRIEFS

FRENCH HIGH-PERFORMANCE IC R&D--Paris--Electronique Serge Dassault (ESD), prime contractor for an industrial group that includes TRT, a French subsidiary of Philips, and Compagnie des Signaux, has just received from the French government a first research contract for very fast integrated circuits, indicated the company in Paris on 4 July. These circuits, the first of which should appear in 1986, will have a processing capacity and a computation speed "much superior to those of the circuits being used today," asserted ESD, pointing out that the applications will be civilian and military. The three companies have complementary strengths, and each one will have full access to the program, added the company. [Text] [Paris AFP SCIENCES in French 11 Jul 85 p 30] 11,023

MATRA HARRIS, SGS DEVELOP IC ASSEMBLY--Nantes--Matra Harris Semi-conducteurs (MHS), a 51 percent Matra subsidiary and 49 percent subsidiary of the American company Harris, has signed an industrial and research cooperation agreement with the Italian company SGS, in the field of components, we learned on 8 July in Paris from the company. This cooperation, negotiated for many months, specifies the future creation of an entirely automatic system for integrated circuit assembly. This program, which involves the study of robots and software necessary for automated production, will be shared between MHS and SGS in France, and SGS in Italy, and will result in the installation of a pilot production line at the MHS plant in Nantes, which already manufactures components. The two companies have decided to create an economic interest group named GEAA (European Group for Automated Assembly), which "ultimately will make it possible to bring back to Europe work which is now performed in the Far East, and to satisfy assembly needs," stated MHS. The companies are also involved in programs aimed at acquiring the design techniques and equipment necessary to create high performance integrated circuits. These programs, accessible to other European partners, are part of the actions selected for the Esprit program: three projects, among which Spectre (development of a sub-micron technology), have already been initiated, and three others are under negotiation. All these projects are "part of the Eureka philosophy," emphasized MHS. [Text] [Paris AFP SCIENCES in French 11 Jul 85 p 30] 11,023

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SCIENTIFIC AND INDUSTRIAL POLICY

MOST AUSTRIANS TAKE WAIT-AND-SEE POSITION ON EUREKA

Vienna DIE PRESSE in German 12 Jul 85 p 9

[Article by Hedi Cech: "Is Technological Integration Preordained? Austrian Firms Take Wait-and-See Position on Eureka"]

[Text] In a flash--in complete contrast to its normal practice--the federal government reacted: only a few days after the new European high technology program Eureka was launched at the EEC summit in Milan at the end of June and Austria was invited to participate in the cooperation, the Ministry for Science and Research began exploratory discussions with management and labor, legislatures, and research support sources to work out the possibility of Eureka cooperation. The goal of the hectic activity: to be able to present a well-thought-out position paper with a list of companies and research facilities at the ad-hoc conference on Eureka called for 17 and 18 July in Paris so that Austria's interests are represented as well as possible in France. For, at this meeting, not only the research ministers and foreign ministers of the 10-member community, but also representatives of the two future EEC states, Spain and Portugal, as well as Austria, Switzerland, Sweden and Norway will sit at the negotiating table and discuss the scope as well as issues of the structure and financing of the Eureka program.

So, while our political leaders (Minister for Foreign Affairs Leopold Gratz: "Eureka is of the utmost importance for the future of our country"; Minister for Science and Research Heinz Fischer: "We must not miss out on the third industrial revolution") already see the small Alpen republic as a technological paradise, Austria's businesses are not quite so optimistic. The "We are basically in favor of participation in international high-tech programs" is followed in most cases by a "but." For the time being, they would like to wait and see what approach will be adopted in Paris and what concept the Austrian government produces after that. But, there are also concerns that the countries will not be able to agree on feasible critical programs; and, not insignificantly, many ask whether the "admission price"--that is the investment--will be amortized for the companies in the foreseeable future. For, in the long run, participation in Eureka--political leaders and industry agree on this--will not only open up the possibility to get in on foreign know-how and to jump on the fast-moving technology express, but above all will bring real production orders and currency.

Eureka (European Research Coordination Agency, with the letter "k" as an accommodation to the FRG, which has a Eureca platform in its space program) is--as DIE PRESSE reported--a French initiative. The members of the EEC are to set up with the participation of non-EEC countries an "a la carte" high technology research program, which would represent a counterbalance to the "Strategic Defense Initiative" (SDI) of the United States--but in the non-military domain. Three major research areas are planned:

-Information technologies (microprocessors, artificial intelligence, telecommunications);

-Production technologies (supercomputers, computer-integrated production);

-Biotechnology.

The goal of the joint efforts should be, according to the French conception, to catch up with the United States and Japan, if not to exceed them, within 10 to 20 years, in the research and development area as well as in economic competitiveness through a concentration of the intellectual and business potential present in Europe.

To Invest Specifically in Promising Projects

The structure the Eureka program will have is as yet undetermined. One variant might be a form like that of COST [European Cooperation of Scientific and Technical Research], a European research cooperative already in existence for over 10 years, in which Austria is also participating with good results. COST distinguishes itself especially through its flexibility and nonbureaucratic structure and fulfills the wishes of the "small" member countries. "Independent of the scope of the research expenditures financed by the individual partners," according to Heinz Schreiber of the Research Section of the Ministry of Science, "each COST partner has a right to the totality of the results obtained." On the other hand, the inclusion of the Eureka program in the EEC commission is being discussed, where Austria--as well as the other countries--would be required to contribute a fixed amount based on a certain distribution formula. Austria is understandably pushing for the COST variant, "since, in this case, we would not only be partners with equal rights, we could also invest the funds available to us quite specifically in those projects which seemed promising to us," says Science Minister Fischer.

Here he touches on a subject of importance to businesses: Financial resources available to domestic firms wishing to enter or already participating in the high tech area are not unlimited. Therefore at the Vereinigten Edelstahlwerken [United High-Grade Steel Works] (VEW) they have decided for the time being against participation in Eureka. Hans Martin Gogela, coordinator for chairman Friedrich Schmollgruber, lists the reasons: With the structural plan 2000 they have already worked out their evolution as a quality oriented technological firm; the product plan (for example, new materials for gas and steam turbines and for coal liquefaction as well as powder metallurgy) does not coincide with the Eureka emphases. They will however continue to participate in COST projects.

The research manager for Elin, Herbert Birkner, also is very skeptical for the time being. His reservations, however, rather concern the fact that Eureka will become a "political end in itself" and too many programs will lose sight of the true goal--that is, integration into the international research level. Elin has nothing against research; for COST they worked in the superconductivity sector and had favorable experiences.

VOEST is currently holding back from participation in the new technology program. The large firm, according to press spokesman Franz Summer, wants to wait and find out what happens in Paris. And then it also depends on what the Austrian government decides to do--only when that is clear will they consider participation.

No matter how this plan of attack finally looks--at the Austrian leading-edge technology firm of Plansee, chairman Rudolf Machenschalk is hoping for a quick decision. "Since we never deliver finished products, but only highly specialized individual components, it is especially important for us to learn about actual projects where we can participate." Financially, Machenschalk sees few problems: "In order not to be left out of the union, one must also be prepared to take some investment risks."

Sports equipment manufacturer Fischer is prepared to invest, but only within the planned limits of the research budget (they did not wish to cite actual figures). The Upper Austrian firm, which in recent years developed supporting poles for the Airbus among other things, can picture itself involved in Eureka cooperation in the field of space flight. Fischer also does not wish to undertake anything without official governmental guidelines.

The reaction of ITT Austria and Simmering-Graz-Pauker (SGP) was totally different. Their decisions to participate have already been made; the Ministry of Science has even been informed already. While ITT head of development Peter Knezu cannot cite any details yet ("We will surely get involved in the information technology sector"), Bruno Krainz, head of technical planning at SGP, can already designate three specific areas: robots linked to CAD/CAM (robots which can build themselves); processing of plastics which are exceptionally light and resistant to temperature variations; as well as aluminum processing. In return for their quick reaction SGP is also expecting a thing or two from the Eureka planners: the investment (Krainz states: "For this we will surely have to increase our 100 million schilling research budget") should pay off no later than 7 years after the beginning of work.

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BONN SETS CRITERIA FOR EUREKA PARTICIPATION

Duesseldorf HANDELSBLATT in German 26 Jun 85 p 3

> [Text] Bonn--The federal government has now set clear criteria which will have to be taken into consideration for technological cooperation in Europe. The focus is to be the non-military use of the research.

In particular, Minister of Research Riesenhuber listed the following points after the session of the cabinet committee on future technology for research cooperation, which has become known by the name of Eureka and which will be the subject of the upcoming EEC summit in Milan:

-A boost for non-military technology must be achieved through the elaboration of joint standards and infrastructures and through the improvement of the allocation processes for public orders to European firms.

-Large and critical projects which can only be handled internationally, such as the development of artificial intelligence computer systems or the analysis of the problems of highly toxic wastes, should fall within the scope of Eureka.

-The research group should be open to European countries outside the EEC as well as to the states of the EEC. Appropriate groups must meet for each project.

-Ponderous bureaucracies must be avoided.

-Finally, in industrial projects within Eureka, care should be taken that adequate participation of industry is present to assure the usability of research results from the start.

The specific design of Eureka, and its financial base, must be formulated in the coming months. So far, as announced by the Ministry of Finance on Tuesday, not a single mark is in the "finance pot" for Eureka.

For European research the same as for national research, Riesenhuber stated the requirement that governmental activities must concentrate on basic research, the setting of basic conditions, as well as on problems of survival.

For European research initiatives, this basic principle also holds: the nearer the research is to the market, the greater the financial involvement of business itself should be.

In conclusion, Research Minister Riesenhuber explained: "A Europe of technology is not worthy of our efforts, but what matters is utilization of techniques which permit mankind to live at peace with nature, and, to that end, careful management of resources, energy and the environment. Eureka is a request to the political leadership of Europe to develop modern techniques increasingly for the solution of problems."

Before the EEC summit discussions at the end of the week in Milan, French and German political leaders will meet again this Wednesday in Bonn to reach agreement on Eureka plans.

The federal cabinet worked again on Tuesday on a further research policy theme and agreed on the technical information program for the years 1985 through 1988. Within it the federal government established the new orientation of its technical information policy and formulated its future goals, set new guidelines for the relationship between government and business, and concentrated support on critical issues.

Through 1988, a total of DM 939 million will be available for the further strengthening and expansion of federal computer database systems to bring the FRG to the fore in the competition for the new "production factor of technical information" of which Research Minister Riesenhuber speaks.

Production and supply in the technical information market are, according to the government guidelines, primarily the responsibility of private industry. The federal government does not intend to follow through on its original plan to establish 20 technical information centers and will limit itself to critical issues. Among these are the creation of a full text database in the patent division, the establishment of databases for the health service as well as the agricultural and environmental areas. Gradually, an information network for industry and applied research is to be developed which will facilitate access to German and foreign databases in a worldwide cooperative for users in science, industry, government and society.

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SCIENTIFIC AND INDUSTRIAL POLICY

MILAN SUMMIT ON EUREKA, FRENCH PROPOSALS

Paris AFP SCIENCES in French 4 Jul 85 pp 8-13

[Text] Milan--The European Council, which met in Milan on 28 and 29 June, expressed its support for the French Eureka project aimed at creating a technological Europe as well as for the "constructive proposals" made by the Brussels European Commission with the same goals.

According to the final press release of the summit, it "wanted" the Eureka project to be open to "those countries outside the Community who have already indicated their desire to participate."

The release further states that France, in conjunction with the presidency of the EEC and the Commission, is following up by convening an ad hoc committee before 14 July to discuss European technology. This committee should include the ministers responsible for research and other qualified representatives of the governments who support this initiative, as well as Commission representatives.

The release goes on to state that the European Council considers that these activities must "take advantage of the European dimension" to:

--"establish a close relationship between technological development and the effort to unify the internal market, for example by using practical measures of encouragement such as the "Eurotype" proposal (common standards for technological products),

--assure coordination between the technological effort and common policies, particularly trade policy towards principal [trade] partners,

--reduce the risks of needless duplication of effort on national levels and assemble a critical mass of financial and human resources,

--take full advantage of technical and financial instruments of the Community, including the instruments of the BEI [European Investment Bank], which are immediately available."

French Proposals for the Eureka Program

At the Milan summit, France proposed contents for the Eureka program: 5 priority activities have been defined in the context of the document entitled "The Technological Renaissance of Europe." In the introduction to this document, Roland Dumas, minister of Foreign Affairs, and Hubert Curien, minister of Research and Technology, detailed the French concept of this ambitious project:

"Faced with the considerable efforts deployed by the United States and Japan, if Europe intends to respond to the technological challenges of the end of this century, it must quickly master the expertise that, tomorrow, will be at the heart of the third industrial revolution. We must choose quickly among the options that will lead to decadence or to the technological renaissance of Europe.

"We already know where our principal effort must be made. In fact, information technologies, production technologies and the technologies of plant and natural resources constitute the core of knowledge and talents that will open the doors of the third millenium for us.

"These technologies form a coherent whole, an original structure whose components are the computer and software, robots and "flexible" workshops, lasers and new materials, communications and transportation and, finally, the biotechnologies.

"Our future hangs on consolidating and reinforcing this knowledge and expertise. They will affect our ability to innovate work conditions, to renew relationships among people, to revamp training, health, leisure activities. Finally, only mastery of these technologies will assure our autonomy of decision and our independence.

"That is why European energies and know-how must be mobilized for precise objectives and programs with clear purposes. Five areas are decisive: computer science, telecommunications, robotics, materials and the biotechnologies. Together we must explore the frontiers of these fields of knowledge and master their concrete applications.

"The technological renaissance of Europe first requires mastery of the technologies of information, production and plant and natural resources.

"The information technologies applicable in a multitude of areas through components and software will open the way for progress that will affect all the other areas of activity.

"The components will be the "primary tools" in the allocation of human inventiveness that will transform them into various products and multiple services. Artificial intelligence and expert systems will mobilize knowledge and, ultimately, facilitate access to it. We must analyze better and understand better in order to transmit better and communicate better. Finally, super computers will help us to manage organizations better and to predict the evolution of natural systems better, from weather to social security.

"Tomorrow, the future of our societies will largely depend on communication among people. Here, technology is full of great promises: voice, data, image transmission, university without walls and remote work stations. These are innovation of all kinds that will be made possible by broad range of means of communication.

"Next, the production technologies, in the form of automated and flexible factories, will constitute the basis of new industrial structures. As instruments of negotiation among social groups, they will be the source of a true industrial renaissance. As for robots, because of their mobility, they will open up access to hostile worlds: ocean floors, high pressures, extreme cold, space. Moreover, they will free us from dangerous and health threatening work.

EUREKA

5 PRIORITY ACTIVITIES FINALIZED

EUROMATIQUE	LARGE COMPUTERS
	PARALLEL ARCHITECTURES
	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS
	FAST SILICON
	AsGa GALLIUM ARSENIDE
EUROBOT	THIRD GENERATION ROBOTICS
	AUTOMATED FACTORY / CADCAM
	LASERS
EUROCOM	RESEARCH NETWORK
	EQUIPMENT FOR BROAD BAND NETWORK
EUROBIO	ARTIFICAL SEED
	BIOMEDICAL ENGINEERING
EUROMAT	CERAMIZED TURBINE

Finally, mastery of the technologies of plant and natural resources is crucial because our food, our health, revitalization of areas that are deserts today, depend on improved control and use of them. Biotechnologies offer us solutions to develop and enrich our agricultural resources. Artificial seeding marks the dawn of a new agricultural e[illegible]

Information Technology

1) Build large capacity computers.

2) Create tools to design and develop artifical intelligence and expert systems.

3) Develop artificial organs that will provide our automatic systems with sight, hearing, touch.

Communications Program:

1) Establish an optical communication network to carry voice, data and images at a low cost.

2) Allow research centers to communicate via suitable networks and allow future machines to communicate using quick switching.

3) Master the electronic image because of its cultural, as well as its economic impact.

Robotics Program:

1) Design a complete automated factory and, thereby, establish a communication network among robots.

2) Develop laser and particle flux machining and assembly.

3) Master miniaturized and mobile robots to work under very severe environmental conditions (underwater robots or a robot to operate during natural catastrophes.)

4) Develop and concentrate all of the optronic, new materials, energy, communications know-how in mobile robots and automated factories.

Program for Plant and Natural Resources

1) Achieve artificial seeding adapted to land and limate conditions.

2) Improve processing conditions for food resources.

3) Access ocean resources.

4) Fight desertification.

(...)

"In the past we Europeans were able to master space and energy problems. Our particle accelerators, our fusion machines, breeders, our planes, our space launchers, our satellites prove that we have covered a considerable part of the ground. Now we must work together on the key technologies of data processing production and natural resources.

"Five programs give form to our determination to act: EUROMATIQUE, EUROBOT, EUROCOM, EUROBIO, EUROMAT," the two French ministers further state in their introduction.

Eureka: Assembling the European Mosaic

Roland Dumas, the French minister of Foreign Affairs, announced on 28 June in Milan that "technology discussions" convening two ministers from each of 16 European nations interested in the "Eureka" project would be held in Paris "before 14 July" for the purpose of studying methods of financing specific programs.

The minister said that the ten nations of the EEC, Spain and Portugal, as well as Austria, Switzerland, Norway and Sweden, will form the ad hoc committee on Eureka that will meet for the first time at these discussions. The president of the European Commission and the commissioner in charge of technology will also participate, he said.

During the work of the European Council, Dumas indicated, the ten [EEC nations] also agreed to study the possibility of "using the services of the European Investment bank (BEI)" to finance the technology programs under Eureka.

The ten also accepted a proposal made by British Prime Minister Margaret Thatcher to create a new European technological standard, that could be named "Eurotypes" or "Eurekatypes", "thus marking the technological progress of Europe on world markets," Dumas added.

Immediately after the summit, the comments at Milan were also accompanied by additional comments in various capitols.

FRG: "The European Eureka research project for civilian purposes and the participation of Europeans in the American Strategic Defense Initiative (SDI) are not incompatible," said West German minister of Research Heinz Riesenhuber on 29 June.

"At most, conflicts could arise between the nations and private companies on the subject of financing various projects in the two programs." According to Riesenhuber, "the possible appearance of such conflicts depends on the manner in which cooperation wi8thin the SDI is organized."

In this context, the minister commented that Eureka had not yet been funded in the 1986 proposed West German budget. France, which originated the Eureka project, has not to date allocated funding for its initiative, noted Riesenhuber.

SWEDEN: After a two-day information mission to the Swedish capital by two representatives of the French government, it was also learned on 29 June in Stockholm from an authorized source that the Swedish cabinet is "very interested" in the project for technological cooperation in Europe.

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SCIENTIFIC AND INDUSTRIAL POLICY

FRG RESEARCH FUNDS RESHUFFLED TO MEET CURRENT NEEDS

Duesseldorf WIRTSCHAFTSWOCHE in German 5 Jul 85 pp 16-18

[Text] Federal Research Minister Heinz Riesenhuber's budget will grow at a higher rate in the next few years than the overall federal budget. In spite of that, money could become scarce. Numerous major projects must be financed.

Not until the very last minute did Wolf Haefele give up hope. The chairman of the board of the Juelich nuclear research facility (KFA) simply did not want to believe that the large spallation neutron source (SNQ) project would not be built after years of planning. As recently as January of this year, Haefele had gotten confirmation from American scientists "that the SNQ would become, according to their judgment, the flagship of all neutron researchers by the mid-1990s."

But the death blow came last Wednesday. Hans-Hilger Haunschild, permanent secretary in Federal Research Ministry and chairman of the board of directors of the Juelich major research facility, succinctly announced to the routine session of the supervisory board that the federal government was not prepared to participate in the expensive SNQ financing, which would total DM 2.1 billion (1984 prices).

And since the state of North Rhine-Westphalia, another participant in the Juelich research institute, is not in a position to bear the costs alone, Haefele had to close the SNQ file. For Federal Research Minister Heinz Riesenhuber, on the other hand, the SNQ burial brings temporary relief to his budget. For, although he came in after the 1982 reshuffling with the goal of making the budget of the Research Ministry more flexible and more potent, the minister has now taken on so many major projects that he risks financial difficulties soon.

He is participating with DM 840 million in the new Hera cyclotron at the German Electron Synchrotron (Desy) in Hamburg. The construction of the heavy ion accelerator at the Society for Heavy Ion Research in Darmstadt is consuming DM 265 million from the BMFT [Federal Ministry for Research and Technology] budget. And the continental deep drilling program will draw DM 450 million from the Riesenhuber budget.

All told, according to an accounting by the basic research division of the ministry, major basic research projects with a value of DM 7.5 billion are currently under the jurisdiction of the research office.

And Riesenhuber must raise DM 3.2 billion of that. If the men in Bonn had decided in favor of the neutron source, the size of the amount would look even more formidable. The total costs would have climbed to DM 10.4 billion, with the research ministry's share at DM 5.9 billion.

Thus, even without the major Juelich project, Riesenhuber is moving "close to the limit of what is financially safe," fears the research policy spokesman of the SPD contingent in the parliament, Josef Vosen. The Research Minister will in fact have to enlist the help of Federal Minister of Finance Gerhard Stoltenberg if he is attracted to further major projects.

The Social Democrat has his eye on some quite specific projects whose financing he can hardly consider guaranteed: the two space projects Columbus and Ariane, which alone will cost the government some DM 1.6 billion by 1989 (in 1984 prices), as well as German participation in the Eureka program.

The financial effects of this French idea must not be overlooked since it "is thus far a large proposal, the desire, to achieve a technological boost through cooperation," as Heinz Riesenhuber stated after his most recent discussion with his French counterpart Hubert Curien.

And for the internal debate in the government over the American Strategic Defense Initiative (SDI), the research minister gave his officials the directive that not a pfennig would be available for it from his budget.

Riesenhuber did well again in the formulation of the 1986 budget. In contrast, for example, to the budget of Minister for Education Dorothee Wilms, reduced by 0.2 percent, his budget is increasing next year 3.6 percent more than the national budget, with a rate of increase of only 2.4 percent. And in the intermediate range financial planning until 1989, there are only three ministries which, following Stoltenberg's wishes, will be allowed to increase expenditures more than the federal budget: defense, developmental aid and research. Riesenhuber's till will contain DM 7.45 billion next year, DM 8.43 billion in 1989.

The Research Minister can thank space research primarily for the growth of his budget. The funds earmarked for it are to rise from the current DM 736 million to DM 1.27 billion in 1989. That is an increase of 72.5 percent. On the annual average, expenditures for space are growing by 18 percent.

The renovation of the research budget was primarily possible through erosion of energy research funds. "Especially because of the decrease of the allocation for nuclear energy research by almost DM 900 million" (according to the statement of basic principles in a memo to the minister), the 36.3-percent share of expenditures for infrastructure technologies in the research budget of 1982 will fall to approximately 15 percent in 1989.

Certainly--with the drawing up of the new budget plan and the intermediate term financial planning for his ministry, Riesenhuber was forced to realize that promising change is not the same as actually accomplishing it. Contrary to his advance announcement of drastically limiting direct subsidies for projects through the Research Ministry, the expenditures for this area of responsibility of his department still make up the largest chunks of the total budget. It is true that the funds provided for subsidizing specific individual projects in industry and science are falling off slightly next year to DM 3.37 billion.

However, in 1988 the funds will again amount to DM 3.51 billion and a year later DM 3.54 billion--not counting the funds flowing into space research and major research installations. The expenditures to support projects would then become almost as high as before the reshuffling.

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SCIENTIFIC AND INDUSTRIAL POLICY

FRANCE PROPOSES 3 PERCENT OF GDP FOR R&D BY 1990

Paris L'EXPRESS in French 21-27 Jun 85 pp 50-51

[Article by D. S.]

[Text] As appropriations increase, Hubert Curien launches a three-year plan in which major projects and industrial research will be priorities.

"It's a good law, don't you think?" Hubert Curien asks with the confidence of someone who does not expect to be contradicted. The minister of research and technology knows it very well: "his" law, dubbed the Three-Year Plan for Research and Technologic Development by the administration, is already well launched, as they say in rocketry. It was approved on 29 May by the Economic and Social Council with a large majority (163 in favor, 17 abstentions); it was adopted on 5 June by the Council of Ministers; and it will be presented on 27 June to the National Assembly by the Prime Minister himself. From his position as head of the National Center for Space Studies (CNES), Mr Curien has certainly remembered the technique for sending things into orbit!

The three-year plan which he is submitting to the representatives is summarized by this formula: Priority to science! While other ministries are preparing to tighten their budgetary belts (an average reduction of 3 percent is expected for 1986), the Ministry of Research will see its appropriations increase: 4 percent per year (in constant francs) for the civilian research and development budget (which for the Communist Party is still insufficient). For the duration of the plan, 1400 new jobs will also be created every year. To encourage manufacturers to become involved in innovation, they will also be offered nice fiscal presents. To make a long story short, they will try to put into practice a good old notion: to revitalize France, science must be pumped up.

Stubborn Ailments

It is true that France's research is barely emerging from a long lethargy. We can remember that in 1981, Jean-Pierre Chevenement, new minister of the new Ministry of Research, was travelling from town to town for consultations with French scientists. His bubbly "national colloquium" had once more disclosed

the same stubborn ailments: the famous lack of appropriations, to begin with, the recurring refrain of France's researchers; but it also revealed the sterile cloistering of various disciplines, the threatening senility of the scientific community, resulting from the fact that no positions were being created, its chronic inertia, and especially, a poor circulation of grey matter among the three big sisters--universities, research, industry--which were dramatically isolated instead of being united in what should be a single productive and innovating flow.

In 1982, Chevenement prescribed the first cure: an "orientation and programmation" law, of three years' duration, which initiated the so-called "mobilizing" programs: biotechnologies, energy, electronics, scientific agriculture; all of it topped with a policy of scientific employment and an ambitious objective--bring France up to the level of other developed countries by raising the national research effort to 2.5 percent of the gross domestic product in 1985 (against 1.8 percent in 1980).

Today, at the conclusion of the Chevenement Law, the goal has not been attained: research amounts to only 2.25 percent of the gross domestic product (equivalent to about 100 billion francs). "That is already quite spectacular, considering current economic conditions," observes Mr Curien. Compared to the other developed nations however, France is still below par: 2.6 percent for Japan and FRG, and 2.7 percent for the United States.

In proposing his three-year plan, the minister thus wants to spur things on; his objective is 2.65 percent in 1988, and even 3 percent in 1990! The new bounty will first of all be used to better equip laboratories, notably with computers, which many researchers are clamoring for. But also of course, to finance the European Eureka offensive: France, whose idea it was, must set an example!

In fact, Mr Curien claims to be quite determined not to get mired down in the EEC swamp; first by defining very specific objectives, such as the construction of a supercomputer, and then by gathering together all the partners. Like the European space effort, European technology will not necessarily be an EEC effort; it does not matter whether it will take two, three, or twelve countries, but it will be done!

Priority is therefore given to major projects: Ariane, the orbital station, maybe the European shuttle, the Airbus A320, the oceanographic fleet. While he is at it, the minister of research is using the opportunity to clean house in the famous mobilizing sectors: launching a "new materials" program, refocusing biotechnology efforts on agricultural food products, restructuring electronics, and discreetely forgetting about "French as a scientific language" by quietly burying MIDIST, the Interministerial Task Force for Scientific and Technical Information, which was interministerial in name only.

It's understood: the Curien plan is aimed especially at applied research, and does address the neglected industrial sector. The plan doubles the rate of research tax credit, which becomes 50 percent. In other words if a

manufacturer invests one million francs in research today, he will henceforth be entitled to a tax reduction of 50 percent on one million francs of his profits (with a ceiling raised to 5 million). It is somewhat as if every year the government injected about 700 million francs in industrial research. Last year, 1600 enterprises, most of them small and medium-size companies, already took advantage of it.

"Mobility, mobility!"

Another innovation is that French employees will be able to take one-year "research leaves" to perfect the invention of their dreams or to gently drift into a creative trade. At the same time, established scientists are firmly invited to travel: "Mobility, mobility!" To implement what until now was only the Coue method, the minister creates special positions in the large agencies to receive the thinkers of the private sector; conversely, he will propose arrangements whereby public sector researchers will be able to contract for work on the outside. The warning is explicit: everyone has to get moving and select innovative research topics.

Mr Curien knows very well that a researcher cannot be transformed into a "finder" by simple decree. Creativity can't be dictated, but it does evolve: the major programs will thus be examined each year by the Higher Research Council. An omen of change is that the latter will make its conclusions public. Goodbye, ivory towers! The absent minded professor will henceforth have to justify the maxim that science is France's future.

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SCIENTIFIC AND INDUSTRIAL POLICY

COMMENTARY ON THOMSON, FRENCH INDUSTRIAL POLICY

Zurich NEUE ZUERCHER ZEITUNG in German 31 Jul 85 pp 9-10

[Article by G.S.: "French Industrial Policy Between European Consciousness and Protectionism"]

> [Text] On account of its takeover policy, the Thomson Concern has again and again made headlines in the FRG. Through these takeovers, the concern's autonomous household appliances group (turnover approximately 21.5 billion francs) has become one of the few French enterprises that are firmly established in both of the EC's "core countries." Thomson Grand Public [Thomson Consumer Products] could thus be said to be a test case in regard to the French concept of what a Europe-oriented industrial policy could and should be.

Tonnerre/Villingen, late July. When Thomson took over hallowed German brands such as Dual, Saba, Nordmende and, above all, Telefunken, this move apparently was seen in some quarters east of the Rhine River as "sellout of the homeland." So it would have been advisable to exercise caution, especially since Thomson had already made a takeover offer to Grundig and had on that occasion encountered an attitude of national pride mixed with regulatory purism. The enterprise did not always show sufficient prudence in this respect--one only need mention here the replacement of Telefunken's management.

Striving for a Truly Multinational Position

In the meantime, however, the company has been learning a few things in this regard. Thomson Grand Public is trying to become a truly multinational group--there are very few French enterprises one could say this about, in the state sector probably only Saint-Gobain and that firm can fall back on many years of experience. After all, the volume of turnover abroad accounts for nearly 60 percent of the total, and as far as "brown goods" are concerned, Germany's share (34 percent) exceeds that of France.

It goes without saying that a truly transnational stance cannot be produced overnight, let alone for free. But the company is making every effort to accomplish this: quite a few of Thomson's executives have a command of two or more languages (in France, this has never been a matter of course) and

language training is being promoted on all levels. Germans are represented in top management and, thanks to the 4-percent AEG capital share, in the administrative council. In the view of the top management, the share of German and other foreign capital could be increased still further so that there might develop a geographically balanced capital structure--which, to be sure, must never jeopardize French control. In Germany the plants are run by German executives--a mode of operation customary for truly multinational enterprises.

Thomson is also trying to invalidate criticism to the effect that the state-controlled French enterprise's employment policy is implemented at the expense of the foreign subsidiaries. In making painful cutbacks after the takeover of the German plants, for example, Thomson shut down not only Ulm (Videocolor), but also a plant near Rouen (Saba), and Thomson even claims--without being prepared or able to substantiate this, though--that the personnel cutbacks were balanced equally between Germany and France. It is obvious that the drive against production fragmentation and the continual improvements in regard to efficiency are bound to entail consequences. But if these consequences were felt exclusively outside of France, the reservations entertained in Germany in particular against a French enterprise--and a nationalized enterprise at that--would receive further justification.

Geographic Concentration

The recent decision to concentrate most of the research and development work in Villingen (Black Forest) represents an attempt decisively to counteract such a development. At the same time, however, this move has given rise in France to rather acerbic criticism, even though all the "white goods," the picture tubes and electronic components, are exclusively produced in France even today. Of the presently 230 persons working in the Angers research laboratories, approximately 140 will be staying, with no more than 60 employees doing actual research on home computers and 80 persons engaged in applied research concerning standardized basic products for the national market. Approximately 30 engineers will be transferred to Villingen, while 60 positions will be cut. At the Black Forest plant, some 300 people will at that stage do the entire research and development work (with the exception of personal computers) in the field of entertainment electronics.

This choice was influenced by practical as well as strategic considerations: there is a French garrison in the Black Forest and the French people's social and educational integration therefore is less difficult there than it would have been vice versa in Angers. Moreover, there is high praise for the quality of recreational opportunities and public transportation. Incidentally, the Villingen laboratory employs many other nationalities besides French and Germans, above all researchers from the Far East and from Japan in particular. Besides, Tokyo has a small laboratory of its own, employing approximately 20 researchers.

This is one of the various ways devised to meet the Japanese challenge--a challenge that appears to be viewed as a threat by Thomson and probably in France as a whole. There is yet another response, namely the attempt to

concentrate production as well--the as yet fragmented European market notwithstanding--and thus to enjoy the advantages offered by series production. In the long term, Thomson would like to set up specialized plants for each product--an ideal that in regard to "white goods," but also in regard to picture tubes, is not very far from realization. It is an open secret that in the course of streamlining the organizational framework, the Telefunken Works, too, will have to be totally integrated with the other production facilities in a single chain of command.

Obstructionist Politicians

The geographic concentration is to be accompanied by a reduction of production capacities; the necessity of this move is obvious in light of the fact that of the 2.5 million color TV sets produced in Germany each year, approximately 800/900,000 sets never move from the stock rooms. The French, however, are inclined to tackle the problem of reduction of excess capacities not through free-market competition--which, they say, benefits only Japan--but through arrangements, cooperation or takeovers. Thomson has preferred takeovers, but in making the necessary cutbacks it has not been able to escape being labeled a job-killer.

Understandably, the manager of the German production plants (excluding Telefunken) points out that presently he employs 2,700 people, as against three times as many 4 years ago. All in all, Thomson's labor force in Germany totals no more than 8,000. The criticism is put in perspective, however, once one considers the ultra-modern production plants that nowadays produce remote-control color TVs in less than 2 hours--sets that took 18 hours 15 years ago. They show that neither Luddite-like, antiprogress attitudes nor working-time models driving up per-unit costs can be a viable alternative, if the object is to make good in international competition. At best, one can say that Thomson chose the course that would have been followed by any other enterprise under the same conditions.

On the other hand, it does not enhance the credibility of a supposedly rational policy, when Thomson, a state-owned enterprise, has to ignore the barely concealed intentions of its management and any efficiency-oriented considerations and invest in the crisis-torn Longwy steel basin just to honor the French Government's regional employment policy. Not only because all of the criticism is justified, but because people outside of France and, above all, in Germany are especially sensitive to everything that in a nationalized enterprise smacks of raison d'etat rather than of economic common sense--this is why the government and Thomson bear special responsibility when they undermine through actions of this kind the Europe-oriented industrial policy they believe in, thus aggravating the operating conditions for all imitators.

Staving Off "Unfair" Competition

Protectionist leanings are an integral part of the French view of European industrial policy. Friedrich List comes to life again when it is claimed--with reference to the necessity of developing a certain branch of European industry--that higher tariff rates are quite justified, even liberal. Again,

the field of entertainment electronics--and that means Thomson--is a telling example in this regard: last week, the EC's industrial ministers, pressured by the European Association of Consumer Electronics Manufacturers (EACAM), agreed to raise the tariff rates for video recorders from 8 to 14 percent. The argumentation behind this--which interestingly is supported by the Japanese enterprises producing in Europe, probably for fear of even stricter measures and in order to stave off the growing Korean competition--bases itself on the concept of "fair competition." According to Thomson's top management, fair competition does not exist insofar as Europe has to contend with high labor costs and an insufficient market volume--an illustrative example of the discrepancy between the perspective of entrepreneurial practice and that of textbook theory, which considers precisely such differences in factor costs as the foundation of international trade.

According to Thomson, improved tariff protection for the European products--which protection would be replacing the expiring agreement on voluntary restriction--is in the interest of both the consumers and the national economy and is practically the only chance of survival of entertainment electronics. Along the same lines, the company is now claiming that tariffs are far too low on cameras, loudspeakers, amplifiers, etc. In fact, in the short term stricter tariff protection is unlikely to be disadvantageous to the consumer, since the Japanese producers have so far been held to a minimum price yielding high margins. In Thomson's view, a rate of 14 percent, while compressing the margins, would not affect the sales prices. So the only point of the raise would be to reduce the competition's profits. If this is correct, however, one wonders what this is supposed to accomplish, for by itself scoring off the competition is unlikely to improve the basic conditions and the productivity growth of Europe's industry.

Tariff Protection as Compensation for the Lack of a Common Market

To be sure, the Thomson people, too, know full well they must play up to the public and to the German public in particular. So the company emphatically points out that the measures are only temporary--namely between 5 and 8 years, educational tariffs, so to speak--and that an integrated European market distinguished by uniform standards remains the primary objective. Besides, Thomson can take pride in its recent achievements in developmental work: in Tonnerre, for example, the company has started production of the most "precious" component parts of video recorders; this has made it possible to realize a European net share of 50 percent (to be raised to 65 percent next year) for the J2T-recorders produced in Berlin in a joint venture including JVC and Thorn-EMI. In terms of technology, these sets are in no way inferior to the Japanese recorders and as far as the overall design is concerned, Europe has frequently come up with simpler, more elegant solutions. A certain skepticism seems advisable, however, considering that Japan's video recorder market share in Europe (stated to be 93 percent) is used as an argument in support of tariff protection and that at the same time reference is made to color TV sets, which thanks to tariff protection enjoy a European market share of 85 percent. Apparently no one considers a reduction of these tariff rates, for now they serve to consolidate the positions attained.

Moreover, one sometimes gains the impression that tariff protection is to take the place of a common market, or rather, that for the firms' top management it is easier to urge Brussels to institute tariff protection than to come to an agreement among themselves on uniform standards and to obtain from the politicians genuine market integration.

Is Europe Falling Behind?

From the point of view of branches or enterprises, protectionist arguments and demands--ranging from tariff protection to import restrictions--are convincing, even cogent. But from a national or even international point of view, or in the long term, they often prove wrong. The crucial question is whether Europe will fall behind in the field of technology, unless its industry is protected or subsidized. At Thomson's, they feel that in information science the Europeans have already fallen behind and that the producers of electronic components therefore cannot expect any new ideas from them. This is where the entertainment electronics industry is supposed to step in: it is to become the principal buyer of European components, thereby ensuring that Europe will remain competitive in the electronics industry as a whole.

It goes without saying that to expect the free market to rectify the situation is unrealistic. For in all too many fields of advanced technology all over the world, free-market conditions are nonexistent--one only need mention here space technology, the aircraft industry and the defense-related industries. The electronics industry, too, has again and again received vital impulses from large-scale, state-subsidized projects. In France, this is sometimes perceived more clearly than in other European countries, if only because the country is more motivated than other nations to be among the leaders. Consequently, France's achievements in these fields are quite impressive, as far as technology is concerned. All too frequently, however, this is not sufficient to generate a flourishing industry. This and the realization that going it alone no longer guarantees top performance makes France more committed than other countries to the finding of Europe-oriented solutions.

One often gains the impression, however--and Thomson is a telling example in this regard--that the French tend to try to challenge competitors who are already firmly established. This goes for the European airbus enterprise, for astronautics and, of course, for video recorders.

Jumping onto Moving Trains

This jumping onto moving trains, this--always belated--realization that a certain development might be interesting, this resolve always to challenge a competing bidder or country obviously calls for ever new protection to enable a budding plant to strike root. That it will in time be able to flourish without tender care is by no means guaranteed. And perhaps this lagging behind is a result of the fact that from the very outset there has been the lack of a big market, of truly entrepreneurial attitudes and of conditions conducive to free enterprise and that for this reason the search for new products and new promising markets has been wanting in push. Instead, the

country again and again is taken by surprise by suddenly increasing demand and by the competition's aggressive moves and then--pointing to higher interests--tries to compensate its errors by falling back on protective measures.

It goes without saying that such conditions are found not only in France or only at Thomson's. Nevertheless, it is not by accident that industrial policy of this type is equated with Gaul--it is based here on an ancient tradition and undoubtedly it is deeply rooted in the hearts of large segments of the population. For all the good intentions of its top management, Thomson, too, will only slowly and laboriously be able to neutralize the effects of this legacy.

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SCIENTIFIC AND INDUSTRIAL POLICY

FUJI, THOMSON TO DEVELOP, PRODUCE HIGH-POWERED TRANSISTORS

Milan ELETTRONICA OGGI in Italian May 85 pp 117-122

[Article by P. De Vittor: "New Transistors: Power and Efficiency"]

[Text] The article points up some development lines pursued by Thomson in making innovative products in the field of transistors for power switching and outlines the essential features of the new high-power modules produced in collaboration with Fuji.

We know that Thomson Semiconductors has for several years been a leader in the production of medium-power and high-power discrete units in the European area. From that viewpoint, the French company is working hard to maintain and boost its position by extending the product assortment through the introduction of new-design devices capable of meeting the requirements that emerge in the power switching field.

Many new things have happened in recent years in the power switching area: An example would be the new MOS [expansion unknown] power devices, the GTO [expansion unknown] and the major improvements in the bipolar power switching units whose power limits were progressively extended while the switching times were reduced and the safety operations area was expanded.

Regarding the dilemma of the choice between MOS and bipolar units, it seems quite proper that the respective areas of competence should be defined more clearly. At low voltages and even up to medium currents, the MOS as a matter of fact present low R_{on} along with the absence of a second breakdown which is why they can readily be preferred to the bipolar units also due to their greater switching speed and the simple control procedures. For high-voltage and/or high-intensity current applications on the other hand, the bipolar units indisputably remain the most advantageous as regards the lesser R_{on} and the greater economy.

Development Directions

Thomson recently concentrated on high-voltage and high-intensity current bipolar units with the intention of making optimum use of the performances that can be obtained from the most advanced technologies.

Some key orientations were identified from the angle of the development of highly efficient "cutoff switch" devices, specifically:

Improving the ratio between the useful current I_{Csat} and the surface of the chip, in order to reduce the cost per ampere, and to improve the overall efficiency;

Making the distribution of the current over the active surface more uniform in order to improve the switching performance, the sturdiness, and the reliability;

Optimizing the vertical profile of the doping to extend the safety area upon turn-off (RBSOA) all the way to the guaranteed V_{CEX};

Making the components compatible with simplified controls both for turn-on and turn-off;

Proposing packages designed to simplify the assembly and wiring operations to reduce the overall cost of the instrument;

Characterizing the components (in the data sheets) under real operating conditions and giving additional guarantees concerning accidental phenomena which can damage the components and hence hamper the operation of the system.

Various research programs have therefore been approved with the intention of attaining these objectives. The successive transfer of the results of such programs to the production phase gave rise to the introduction of some new transistor families of the Superswitch 2 series which are very fast during switching operations and which have a high efficiency.

The technologies currently held by Thomson for switching transistors are essentially four in number:

1. Low-voltage epitaxial table characterized by V_{CEO} up to 250 v: The products are represented by individual transistor and with the integrated damper diode; the passivation of the jack is made with SIPOS oxide and PSG glass;

2. Plate, characterized by V_{CEO} up to 400 v and V_{CBO} up to 600 v; the typical products are individual transistors with integrated damper diode and monolithic Darlington units with integrated speed-up diode; the "field plate" and "guard ring" with collector potential is in wide use here;

3. Medium-voltage epitaxial table characterized by V_{CEO} up to 500 v and V_{CBO} up to 1,200 v; the products are individual transistor and monolithic transistor Darlington units with integrated extraction diode; the passivation of the jack is entirely made of glass and an effective diffuse guard-ring is used;

4. Triple-diffusion table for high voltages, for transistor and monolithic Darlington units with V_{CEO} up to 800 v and V_{CBO} up to 1,700 v; here the

epitaxial phase (which can create reliability problems pertaining to the possible local defects connected with the growth of thick epitaxial layers) is replaced by the diffusion of the collector within a high-resistivity substrate.

Starting with these now consolidated foundations, Thomson then introduced some significant improvements based above all on three key factors: (1) Use of a new process for obtaining high-efficiency emitters (HEE emitters); (2) Adoption of doping profiles of the collector projected upon the calculator [computer]; and (3) Use of finely interdigitated emitter geometries.

HEE Process

The first of the improvements introduced by Thomson has to do with the emitter which is why a new process was perfected under the name of HEE (High Efficiency Emitter); it is now used in the production of all transistors of the Superswitch-2 series.

In the emitter area itself, both the total level and the concentration of doping agents have been optimized for the purpose of reducing the influence of that physical phenomenon, known by the name of "bandgap narrowing" which greatly limits the emitter's efficiency. The physical parameter that measures the emitter efficiency is the "Gummel number" G_E which is directly proportional to the product $I_{Csat} \cdot h_{FE}$. For the new transistor of the Superswitch 2 series we have a G_E value in production centering on 10^{14} cm^{-4} sec which is a real record for bipolar transistors.

The improvement of the product $I_{Csat} \cdot h_{FE}$ per unit of area (see the results shown in Figure 1 [not included]) enables us to work with low base current values and, for a given package, to have operational currents that are definitely higher than those obtainable from the earlier technologies. This leads to a reduction in the cost per ampere of the device and the number of components employed on a parallel pattern in high-intensity current applications, with subsequently reduced costs and a decrease in the size as well as the extent of assembly and wiring work. The improvement of the G_E coefficient obtained here is also due to a reduction of the access resistance at [to] the base which improves the f_T of the transistor and brings about more uniform switching, with less power dissipated during turn-off and hence an extension of the safety operation area.

To guarantee the efficient use of the emitter area, it is necessary to reduce the concentration of surface defects. Figure 2 [not shown] compares the results obtained with the new HEE technology and those deriving from earlier technologies, as evidenced by the corrosion figures obtained with the SIRTL jack [attack].

New Methods of CAD

The use of the computer in designing base and emitter surface geometries made it possible--in the new Superswitch 2 transistor series--to achieve a high degree of compensation of voltage drops on the metallized portions of the emitter and the base.

Figure 3 [not shown], for example, shows the result of this surface optimization procedure, applied to a two-stage monolithic Darlington. Here we can see how, in order to balance the drops on the metallized portions, it was necessary to leave some surface zones unused. The result of all this leads to a better balance of the current density (more homogeneous switching) and the reduction of the junction temperature (greater reliability).

The development of programs for the calculation of the RBSOA (reverse polarization safety operation area) then made it possible to determine the optimum diffusion value in the collector above all in the high-voltage structures (beyond 1,000 v) and with precision to determine the requirements for the epitaxial zone in the transitors under 1,000 v, for which purpose one uses a double epitaxia, as a ideal compromise between I_{Csat} and RBSOA and compatibility with wafers having a high diameter (5 inches) with fine-layer thicknesses of up to 150 μm and resistivity up to 100 Ω · cm.

Package and Products

It is known that, in the high-power field, the package assumes great significance: Its features as a matter of fact turn out to be essential in the effort to determine the maximum current, thermal, power, and reliability limits of a component.

Thomson uses a package range extending from TO-220 to TO-3 metallic, to TOP-3 plastic, to TO-31 (insulated version) and to Isotop (see Figure 4 [not included]). The Superswitch-2 transitors are encapsulated in insulated packages such as TOP-31 (the insulated plastic TO-3) and Isotop, both of which are guaranteed for 2.5 kv. Among the latter, Isotop, presented by Thomson in 1980, became very popular because of its original characteristics: Insulation (ISO), connections in upper part (TOP), and pitch of blocking screws identical to TO-3. On that occasion Isotop was improved by modifying the external configuration (reduced, see Figure 5 [not included]) while the epoxidic resin seal is now obtained through "transfer molding" rather than through "injection molding," which results in a stronger hermetic effect and better results in heac fatigue tests. Every component furthermore is available in both screw or fast-on versions.

Working on the Superswitch 2 series, Thomson furthermore tried to optimize both the I_{Csat} in the voltage range V_{CEOsus} from 125-450 v and to improve the high-current and voltage switching performances. For example, the Darlington connection between a BUT60 (TO-220) and a BUT30 (Isotop) makes it possible to switch easily from 120 a to 125 v with a control current of only 0.6 a. Regarding high voltages, Thomson is the only builder to supply BUX98 (400 v/20 a) and 98 a (450 v/16 a) in a plastic package (TOP-3 and TOP-31). For the 400-v transistor, the limits of I_{Csat} were raised to 30 a for TO-3 (BUX348) and to 40 a for Isotop (BUV298). Again looking at Isotop, new switches were presented in the interval of 125-700 v of V_{CEOsus}. The use of a single ESM60454, for example, makes it possible to switch 5 kw to the 220-v grid.

In terms of specifics, likewise, the French company wanted to accommodate the users, specifying its transistors in the last series at three levels of I_{Csat}:

A middle level (with h_{FE} = 20) at low I_B (controllability by integrated components), a high level (at h_{FE} = 10) and another one under repetitive overload conditions.

The Thomson-Fuji Agreement

As announced in an earlier issue of ELETTRONICA OGGI, Thomson Semiconducteurs and Fuji Electric signed an agreement in the field of high-power modules with bipolar transistors,according to which Thomson will, on a license basis, produce the power modules developed by Fuji.

The Thomson assortment as a matter of fact does not have any high-power, multiple-structure modules, such as those of the Japanese producers. Among them (Mitsubishi, Fuji, and Toshiba), Thomson has picked the one which, by virtue of market share, technological affinity, and product, is most in keeping with its own expectations, according to which Thomson expects, by the year 1989, to garner 10 percent of the world share of power-modules with transistor which currently would grow from $50,000 to $300,000 in 1989.

The current trend in the high-power field and the requests from users as a matter of fact are headed toward the use of power modules, such as was done already several years ago for the thyristors, which was supplied in configurations with bridge and semi-bridge by several builders. Thomson as a matter of fact had a requirement for expanding the Isotop line (and selection) toward modules with greater possibilities, specifically for multichip configurations, number of pins, higher power, dimensions of encapsulable chips, etc.

The first series of these modules (available in samples from May to June and in production from July to September) will contain two 50-100-a and 500-1,000-v switches complete with extraction diodes, base-emitter resistances, and recovery diodes of the "soft recovery" type.

The typical applications of these modules will be found in power switch feeders and the control of AC or DC motors for pumps, fans, elevators, rolling mills, extrusion machines, etc., or for electric power welding, starting of servomotors for machine tools and robotics, and so forth and so on.

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SCIENTIFIC AND INDUSTRIAL POLICY

ITALIAN R&D EFFORT SUMMARIZED

Rome NOTIZIARIO DELL'ENEA in Italian Feb 85 pp 62-65

[Summary prepared by Salvatore Moscariello for the 1984 Annual Report of the National Research Council Chairman: "Scientific and Technological Reseach in Italy"]

[Text] In compliance with the provisions of Article 2, Law No 283, dated 2 March 1965, on the reorganization of scientific research, the National Research Council today submits to the CIPE (Interministerial Committee for Economic Planning) a "General Report on the State of Scientific and Technological Research in Italy."

The CIPE expresses its opinion on the general directions contained in it, which must be taken into account in making decisions on coming problems and previously prepared programs.

The report, submitted by Professor Luigi Rossi Bernardi, the new chairman of the CNR [National Research Council], comes in three parts: The first part which has to do with policy and planning; the second part dealing with an analysis of human and financial resources earmarked for research and development; and, finally, a third part consisting of documentation on research activities carried out in Italy.

As we announced earlier in the November-December 1984 issue of NOTIZIARIO, we are publishing a summary of the report below.

Research and Development Expenditures in the International Context

The amount of research and development spending is very important; the higher that amount is for a particular country, the more knowledge will it produce and the greater will be the number of new processes, products, and systems that can be turned out.

Some research sectors involve high costs for the execution of projects, which means that only countries that have the necessary resources can go after such projects; this is true of high-energy physics, as well as space activities, for which even countries with considerable resources have decided to go the road of cooperation, sharing their efforts within supra-national organizations such as the CERN (European Nuclear Research Center) or the ESA (European Space Agency).

The problem of indicators pertaining to the scientific and technical activity effort has been studied for many years on an international scale.

The amount of research and development expenditures and the personnel employed in such activities constitute the most common indicators considered by all countries.

During the 1970's, the industrialized countries of the OECD area had to face serious economic and social difficulties. Various factors (inflation, unemployment, recession, public deficit, lesser increases in productivity) interacted among each other and created particularly critical situations. In this context there is growing interest in the role which science and technology play to facilitate the adaptation of the national economies to the new challenges.

The tables show some indicators pertaining to human and financial resources earmarked for research and development by some industrialized countries, including Italy.

During the 1970's, a period when we witnessed growing public participation in the economy in general, public financing of research was oriented increasingly toward objectives aimed at solving specific social-economic problems: This phenomenon, which emerged in all industrialized countries, could be felt also in Italy.

The variations in the scope of these budget allocations can supply us with useful indications on the development of scientific policy in these countries and bring out the various forms of behavior in coping with the energy crisis, first of all, and then the recession as well as the objectives pursued to overcome and reduce these difficulties.

In the EEC member countries as a whole, two-thirds of the research work financed by the states are channeled toward objectives, such as energy, health and community life, agriculture, industry, defense, space, and the physical and human environment, while one-third consists of resources earmarked for the progress of science in general which is typically identified with research done at universities, without any practical application.

The diverse distribution and intensity characterized by the effort of the state in the scientific and technological research of sectors such as industry, agriculture, energy, and health, depends on various factors: The country's income, the priorities assigned to some problems by the various governments, the country's production, social, and population structure, the existence, in the government machinery as such, of agencies established in the past which cause rigidification in the structure and destination of government fund allocations (especially the current expenditure portion).

After the first oil crisis, public programs in EEC countries for research concerning improvements in the field of energy production and distribution experienced major development.

During the period of 1975-1983, the volume of resources earmarked for the "energy" objective increased considerably in most of the industrialized countries: This was particularly true of the EEC countries. Altogether, these resources came to account for about 10 percent of public financing for research and development; in Italy we arrived at a figure of 22 percent, in West Germany the figure was 16 percent, and in Denmark, it was 10 percent.

Only in France, Belgium, and the United Kingdom was there a decline. The countries that invest most resources in energy research are also among the biggest per-capita energy consumers. Italy and Belgium are among the countries that import more than 80 percent of their energy requirements.

All countries with high investments in energy research produce energy of nuclear origin in more or less significant quantities; however, the increase in spending for energy research toward the end of the 1970's tends to give preference to other sources of energy when compared to those of nuclear energy.

Human Resources Earmarked for Research

In Italy, the number of researchers, both at the universities, in the public research agencies, and in the enterprises is absolutely inadequate when compared to the requirements of an advanced country. Here it suffices to realize that the 20,000 "public" researchers and the about 18,500 "private" researchers in 1979 (the last year for which homogeneous and comparable data are available) amounted to 1/14 of the those in the United States and about 1/8 of those in Japan.

Not only in absolute terms but also in relation to the labor force, Italy employs less resources in scientific and technological research than other countries with which it competes on the markets; for example, for every 10,000 labor force units in industry, we have 7.6 researchers in Italy (again in 1979) as against 42 in the United States, 31 in Japan, 28 in West Germany, 15 in Holland, and 14 in France.

Research personnel in Italy (researchers, technicians, and aides) increased during the period between 1967 and 1982 by 44,736 units with an average annual increase of 3.7 percent less than the increase in spending for research and development at constant prices of that same period of time.

Personnel in the public sector showed an increase of 5.2 percent--more than that of the private enterprises whose number of researchers increased 4.5 percent.

In 1984, the total number of persons working in research in Italy exceeded 98,000 units, confirming the importance, also in terms of occupation, which research has assumed in the Italian economy.

During the year we witnessed a general increase in scientific and technical personnel employed in the public sector and in enterprises with government

participation. Within the former sector, we must report an increase in employment both in the universities (up 4.4 percent) and in the CNR (up 7.7 percent) and particularly in the ENEA [National Committee for Nuclear Energy and Alternate Sources] (up 14.3 percent).

The sector of enterprises with government participation showed a major increase (up 11.9 percent) compared to 1983, thus reversing a trend that had been unchanged for several years.

We must also underscore the decline in personnel of the private enterprises (down 3.3 percent).

Financial Resources for Research and Development

Over the past 2 decades, Italy invested growing financial resources in research and development at a ratio of 1:21 from 1967 until 1984. These resources were slightly more than doubled during the same period of time, in terms of constant money (at 1975 prices).

Total spending for research and development in Italy came to 4,916 billion lire in 1982.

Budget allocations for research and development estimated for the year 1984 come to 8,216 billion lire. From this amount, the government agencies, the research organizations, the public entities and the regions put up allocations for 4,106 billion while enterprises with government participation, the ENEL [National Electric Power Agency], and the private enterprises supplied estimated expenditure funds for 4,110 billion.

The increase compared to 1983 is 1,438 billion lire, or 19.6 percent more than last year; this is due to the public administration to the extent of 807 billion, with an increase of 21.6 percent and the enterprises to the extent of 541 billion with an increase of 15.1 percent.

Financial resources earmarked for research and development in percentages of the gross domestic output however are considered an indicator of a country's "determination to make progress." This ratio, which in the case of Italy is around 0.7 percent for the years 1967-1968, remained at level of 0.8 percent for the entire decade of 1970. The 1 percent threshold was not crossed until 1981. It must however be noted that this result, during the period between the end of the 1970's and the start of the 1980's, is due to the combined effect of increased investments in research activities and the decline in the country's gross national product.

A consolidation above that figure has been estimated for the year 1984; in the light of the estimates for the two aggregates, that ratio however should be 1.34 percent.

In Italy, research expenditures are channeled primarily toward civilian objectives. Expenditures for defense research fluctuate for the entire period under examination around a figure of 4.5 percent.

The objective which, during the period of time under consideration, takes up the largest share among public fund allocations consists of "nonoriented" research intended for the general promotion of knowledge. Funding for this objective is aimed at strengthening basic research, regardless of whether it is conducted in a university environment or in public institutions, with prospects pointing to a result not tied to practical activities.

Among the specific practical application objectives, energy research has for quite some time attracted considerable public fund allocations.

During the 1960's, it covered more than 30 percent of the funds of the public administrations; together with nonoriented research, the two objectives represent three-quarters of the entire public financing volume.

The directions of research within the "energy" objective were changed during the 1970's. In particular, due to the emergency situation (energy crisis), great importance was assigned to research on alternate energy sources as compared to traditional sources and the relative importance of the latter out of the total declined in keeping with the increase in funds allocated for other purposes. Between 1967 and 1983, Italy's fund allocations were increased by 69 percent in real terms (at 1975 prices).

The funds shown here do not include allocations of the ENEL, nor enterprises with government participation, which allocate about 20 percent of their total research and development expenditures to research in the energy sector.

Table 1. Indicators of Resources Earmarked for Research and Development (R&D) in Some OECD Countries in 1981.

Indicators	United States	Japan	Germany	France	United Kingdom	Italy
Total R&D personnel (1,000 units)	1,300 (a)	649	372	249	310 (a)	103
Researchers (1,000 units)	691	393	128	85	104 (a)	52
Total R&D spending (millions of dollars)	73,724	27,104	15,848	10,827	11,304	4,595
R&D spending in % of GDP	2.52	2.38	2.49	2.01	2.42	1.01
R&D personnel in ‰ of labor force	13.0 (a)	11.4	13.6	10.7	1.1 (a)	4.5
Researchers in ‰ of labor force	6.2	6.9	4.7	3.7	4.0 (a)	2.3
Spending per R&D worker (1,000 dollars)	44 (a)	42	43	43	23 (a)	45
Spending per researcher (1,000 dollars)	107	69	124	127	67 (a)	88
Other personnel for each researcher	1.1 (a)	1.6	2.9	2.9	2.0 (a)	2.0

Source: OECD Data Processing, "Science and Technology Indicators," Basic statistical series, recent results, selected S&I indicators, 1979-1983, Paris 1984. Note: (a) 1978.

Table 2. Lineup, by Objectives, of Public Financing of Research and Development in Some EEC Countries, 1974-1983 (Percent)

Objectives	Germany		France		United Kingdom		Italy	
	1975	1983	1975	1983	1975	1983	1975	1983
Earth Environment	1.8	2.2	3.0	2.9	0.7	0.6	1.1	1.6
Human Environment	2.6	3.2	4.5	3.4	2.5	1.1	1.3	1.0
Human Health	4.3	5.8	4.9	5.3	3.2	2.1	2.6	5.3
Energy	10.5	16.9	8.6	7.1	7.3	5.3	17.6	23.3
Agricultural Productivity	1.9	2.1	3.8	3.2	4.4	4.0	3.0	4.1
Industrial Productivity	7.4	11.0	14.3	12.4	12.4	6.6	10.3	19.3
Life in Society	4.9	3.7	1.1	1.5	1.0	0.8	1.4	1.6
Space	4.2	4.3	5.6	4.4	2.3	1.9	8.5	4.6
General Promotion of Knowledge	51.5	41.3	24.1	25.3	19.9	27.7	50.8	31.8
Defense	11.0	9.4	29.8	33.2	46.4	50.0	3.4	6.1
Not classified	-	-	0.3	1.3	-	-	-	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Public Financing in:								
-% of GDP (1975-1982)	0.96	1.20	1.44	1.36	1.27	1.36	0.40	0.64
-% government budget (1975-1982)	4.37	4.21	5.50	5.79	2.86	3.19	1.40	1.36

Source: EEC, "Public Financing of Research and Development in the Countries of the Community," Crest, 1204, 84.

Table 3. Number of Researchers in Relation to 1,000 Labor Force Units

Countries	1973	1975	1977	1979	1981
United States	5.8	5.6	5.6	5.8	6.2
Japan	4.5	4.9	5.0	6.5	6.9
West Germany	3.4	3.6	4.4	4.5	4.7
France	2.7	2.8	3.2	3.2	3.7
United Kingdom	-	3.1	-	4.0	-
Netherlands	2.5	-	-	3.6	3.6
Canada	-	1.5	-	2.4	2.5
Sweden	3.0	3.6	-	2.8	3.5
Italy	1.7	1.6	1.8	2.1	2.3

Source: OECD Data: "International Statistical Year," various years; for Italy, data were processed by the ISTAT [Statistics Institute] for 1973 and 1977.

Table 4. Allocations for Research in 1984 (Estimated Data)

Research Sectors	Billions of Current Lire	%
Public Administration (a)	4,106	50.0
State Administration	1,181	14.4
Research Agencies (CNR, ENEA)	1,838	22.4
Universities	938	11.4
Other Public Entities	149	1.8
Enterprises	4,110	50.0
ENEL	152	1.9
Enterprises with Government Participation	1,688	20.5
Private Enterprises (b)	2,270	27.6
Total	8,216	100.0

Source: CNR. Note: (a) The public administration sector includes agencies of administration directed by the state, the CNR, the ENEA, the universities, and other public entities that do research; this last item also at this time includes research entities defined by Law No 70, dated 20 March 1975, and successive inclusions as well as the regional administrations; (b) The total estimated data for 1985 were furnished by the ISTAT (ISTAT, NOTIZIARIO, Series 4, Folio 41, Volume V, No 4, June 1984).

Table 5. Gross Domestic Product (GDP) and Spending for Research and Development (R&D) in Italy (in billions of lire)

Years	Gross Domestic Product (GDP)	Total R&D Spending	Pub. Admin.	Enterprises
1967	46,695	344	169	175
1968	50,614	400	193	207
1969	55,876	464	226	238
1970	62,883	554	252	302
1971	68,510	623	275	348
1972	75,124	686	301	385
1973	89,746	788	373	415
1974	110,719	917	410	507
1975	125,378	1,168	517	651
1976	156,657	1,352	612	740
1977	190,083	1,684	782	902
1978	222,254	1,867	844	1,023
1979	270,198	2,288	953	1,335
1980	338,743	2,897	1,187	1,710
1981	401,579	4,056	1,770	2,286
1982	471,390	4,916	2,126	2,790
1983	531,300	(*)6,413	(*)2,982	(*)3,431
1984	(*)612,100	(*)8,216	(*)4.106	(*)4,110

Source: Data Processed by ISTAT and CNR. (*) Estimated data.

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SCIENTIFIC AND INDUSTRIAL POLICY

BRIEFS

FRENCH R&D BUDGET--Paris--Despite a government reduction in 1986 expenses, research in France will be "well endowed," indicates the Ministry of Research and Technology. According to different sources, Research, along with Education, Police, and Justice, remains indeed one of the government's essential priorities in this budget, which for the first time will exceed the turning point of 1000 billion francs, but which nevertheless will be only 3.7 percent higher than the 1985 budget. The major lines of the research budget, which are still under discussion, will be consistent with the provisions of the three-year research plan adopted after a first reading by the National Assembly (by the socialist representatives alone) on 28 June (see AFP SCIENCES, No 463, 4 July 1985, pp 1-7). We know that this plan stipulates an average 4 percent growth in the R&D budget during the next three years, so that according to reasonable extrapolations, France will come very close to the more advanced countries, which at the beginning of the next decade will devote about 3 percent of their gross domestic product to technical research and development. [Text] [Paris AFP SCIENCES in French 25 Jul 85 p 1] 11,023

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TECHNOLOGY TRANSFER

NETHERLANDS FIRM CLAIMS TOO MUCH RED TAPE IN COCOM RULES

Rotterdam NRC HANDELSBLAD in Dutch 3 Aug 85 p 9

[Report by Zeger Luyendijk: "Infotheek Personal Computer Importer: 'The Netherlands Exaggeratedly Abides by COCOM (Coordinating Committee for Export to Communist Areas) Rules'"]

[Text] Leiden, 3 Aug--Infotheek BV [Limited], a 50-employee wholesale company in personal computers, related equipment and parts wants to leave the Netherlands and go to the United Kingdom or Belgium because it is tired of the patriotic red tape with respect to the rules for the import of computers into the Netherlands and their export to other countries in the EC.

The reason: personal computers (with 16 and 32 bit microprocessors) and their parts are recorded on the list of "strategic goods" which cannot be exported to the Soviet Union, China, the East Bloc countries and other non-Western states: the so-called COCOM list. It appears that the Dutch trade authorities are very strict in controlling the trade in certain articles. "Too strict," says Infotheek Director W. van Leenen.

Because of the sensitivity of the goods, the United States asks for proof from the country of destination that the goods indeed go there. That proof is given in the form of an International Import Certificate (IIC). Against such an IIC, the American exporter is then given an export license by the United States. Once the goods have been shipped, the country of destination checks the arrival of the shipment by way of clearance documents. Amongst other things, they look at the quantity and description of the goods. The country which has received the goods is simultaneously expected to keep an eye on the potential re-exportation of the goods.

In the Netherlands, according to Van Leenen, an IIC is issued only for a certain, often minimal, quantity of goods for a period of at most 3 months. That doesn't even happen in the United States," he exclaims despairingly. "There a company gets an export license for at least 1 year. And that is very logical, for it may take a while until a product sells well. In carrying out rules the Netherlands is even more catholic than the Pope."

Rigmarole

Van Leenen gives a detailed example of an average Dutch procedure. The merchant places an order for 1000 "memory boards" (boards with chips with which the memory of a computer can be expanded) and applies for an IIC for that at the Central Service for Import and Export in Groningen. Van Leenen: "Groningen then asks: do you really need them? How many do you expect to sell in the first 3 months? Then an IIC is issued for that quantity, let's say 100, for 3 months. Subsequently it takes 10 weeks until the first shipment can be sent because the manufacturer in the United States has to obtain an export license with the IIC. If the product sells well, you have to go through the entire rigmarole once again for a new import license. That is an enormous loss of time because in the meantime sales stagnate."

If the number of memory boards that were shipped don't tally with the number received, or if a license has not been completed within the stipulated period, the next license is issued for a smaller number of articles. "We started as a company in 1982, and a beginning entrepreneur cannot be blamed for making mistakes with such a complicated procedure," says Van Leenen. "Even a shipping agent, for example, sometimes makes a mistake with that. Groningen is unrelenting, however, and even threatens not to issue any licenses at all if we don't follow the procedures accurately. They became furious in Groningen when at one time we turned to the department of economic affairs in order to get a license rapidly. For that matter, we are still corresponding with Economic Affairs about the state of affairs."

EC

Van Leenen complains that because of the laborious procedures, his company is acquiring a disadvantageous competitive position with respect to other countries in the EC. Van Leenen: "We export mainly to the EC. It is known that in the United Kingdom import licenses are issued with much greater ease than here and also for longer periods, and also Belgium would be much more flexible. Moreover, for the export of COCOM articles, the Dutch authorities are just as difficult as for the import, even to countries within the EC."

Borsumij [Borneo-Sumatra Trade Company]

Van Leenen is so outraged over that that he would by far prefer to transfer his shop to the United Kingdom or Belgium. Another possibility would be to challenge the Dutch state in Strasbourg on the basis of article 3c of the EC treaty in which the removal of "obstacles for the free flow of persons, services and capital" is mentioned as one of the chief objectives of the Community.

The trade company Borsumij says it is aware of the problems. "It is indeed true," says J. Noordam of Borsumij, "that in the United Kingdom licenses are issued somewhat more quickly. The United Kingdom simply has more experience in that than the Netherlands because it has been involved longer with these types of 'strategic articles.' They have a better knowledge of the clauses, etc. on re-exportation of goods which the very exacting Americans want included in the licenses. If you start with trade in these goods, the

procedures are a dire misery. After some time, however, if everything is set up well, you have all the required licenses within a short time, also from Groningen. We are getting a new license within a few days for additional quantities of goods."

Borsumij says that still now, when a product is not yet known, problems occur because some merchants, for example, must still be "screened" for security. "But as long as the quantities of articles listed in the licenses correspond, there are no real problems," says Noordam. "Anyway, it is really a question," he adds, "whether personal computers and parts for those should actually still appear on the COCOM list."

Van Leenen also wonders about that. "The personal computer has become a mass product. It is estimated that this year over 1 million personal computers will be sold in Europe. The trade authorities simply have not counted on these quantities. The cheap (8-bit) home computer was also removed from the COCOM list, wasn't it?"

Control

The department of economic affairs says it is surprised that a company, in this case Infotheek, with which it is still corresponding about a specific problem, decides to make those problems public.

"In general," according to a spokesman of the department, "controlling trade in goods which appear on the COCOM list simply takes time. Such control looks specially at whether the data on the import license correspond with those on the export license. If there are doubts, for example if the numbers don't match, the forms are checked. In order to carry out the control as effectively as possible, the Dutch Government opted to issue the licenses only for a certain period, in this case 3 months."

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September 26, 1985